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Welding in Shielding Gases

mechanized filler wire feed. The welding head is directed along the butt with the aid of a photo-electric system and maintains automatically the given arc length. The tungsten electrode diameter is 2-6 mm; that of the filler wire 1.6-2 mm; welding current is 350 amp and welding speed is 10-40 m/hour. The АСГ-2 (ASG-2) unit (Figure 10) is intended for automatic welding with tungsten electrode in shielding gases with or without filler wire supply. The following devices are included into the unit: a system with an electric-inductive pick-up reacting to changes in eddy currents, directing the electrode along the butt; a special ПГУ-10М (PGU-10M) television device with 5:1 image scale, is used for the remote control. The unit can be employed for welding 2-10 mm thick metal on 300 amp current; the diameter of the tungsten electrode is 3-5 mm; that of the filler wire is 1.5-2.5 mm. Wire feed rate is up to 250 m/hour. Accuracy of tracking is 0.25 mm; accuracy of arc voltage maintenance is 0.25 v. The arc length is regulated at a speed of 8 mm/sec. The weight of the welding head is 8 kg.

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Welding in Shielding Gases

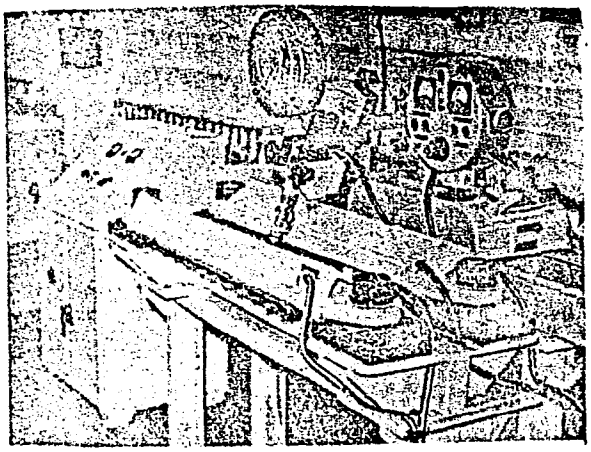

Figure 1.
The ADSPV automatic welding tractor.

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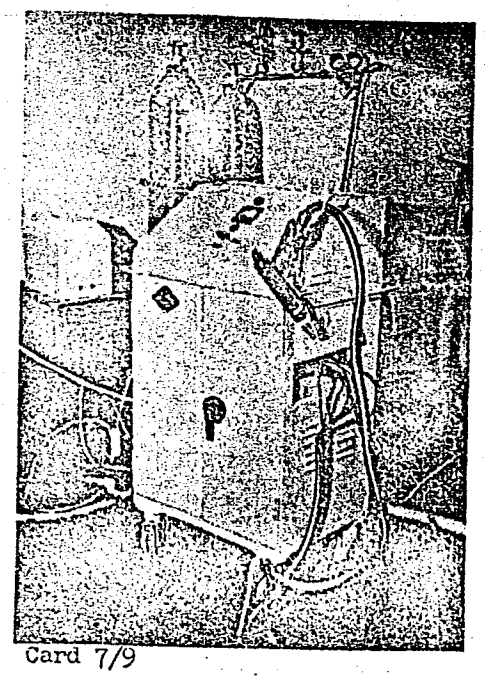

Figure 2.

The ADTS-5 unit for argon-arc spot welding.

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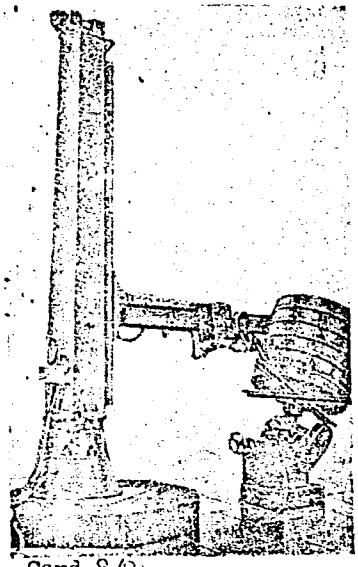

Figure 3. The ARK-2 radial-bracket automatic machine.

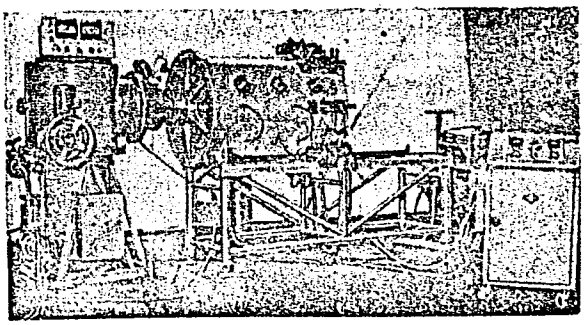

Figure 6. The VUAS-1 unit for welding in controlled atmosphere.

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Welding in Shielding Gases

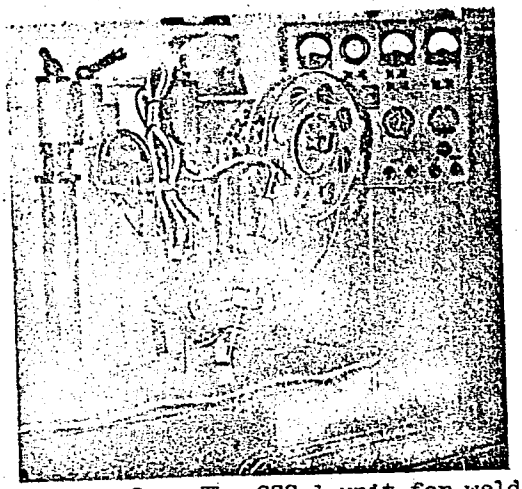

Figure 9. The GSS-1 unit for welding with a tracking system.

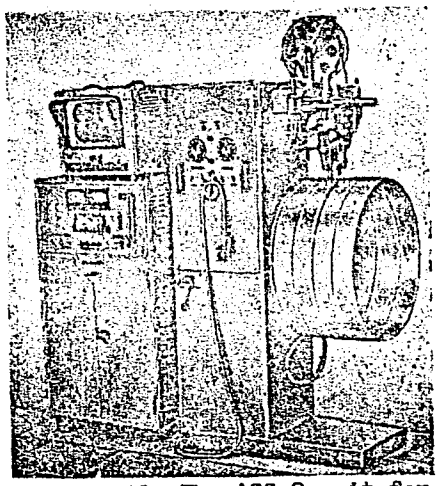

Figure 10. The ASG-2 unit for welding with remote television control.

There are 10 figures.

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L 23456-66 EWT(d)/EWT(m)/EWP(v)/T/EWP(t)/EWP(k)/EWP(h) IJP(c) JD/HW

ACC NR: AP6006332 (N) SOURCE CODE: UR/0413/66/000/002/0056/0057

AUTHOR: Yakovlev, V. A.; Dubrovskiy, S. M.; Lykova, Z. V.; Berman, A. S.; Lyubavskiy, K. V.; Antonov, Ye. G.; Smirnov, A. G.; Makhanev, V. I.; Vesenko, N. V.

ORG: none

TITLE: Device for automatic welding of hardening steels. Class 21, No. 177981

SOURCE: Izobreteniya, promyshlennyye obraztsy, tovarnyye znaki, no. 2, 1966, 56-57

TOPIC TAGS: automatic welding, induction welding, steel

ABSTRACT: An Author Certificate has been issued for a device for automatic welding of hardening steels. The device consists of an automatic welder and an inductor. To make it possible to control the heating rate, the welder and conductor have a movable interconnection which can by adjusted by a screw or a rod. [LD]

SUB CODE: 13/ SUBM DATE: 31Jan63/ ORIG REF: none/ OTH REF: none/

Card 1/1 VLR UDC: 621.791.037:621.078.012

APPROVED FOR RELEASE: 06/08/2000 CIA-RDP86-00513R000205010011-1"

"APPROVED FOR RELEASE: 06/08/2000 CIA-RDP86-00513R000205010011-1

BORODKIN, V.I., kandidat ekonomicheskikh nauk; SKRIPNIK, A.M., kandidat ekonomicheskikh nauk; BERMAN, A.Ya., kandidat tekhnicheskikh nauk.

"Economic aspects of the nonferrous metallurgy in the U.S.S.R." S.A.Pervushin and others. Reviewed by V.I.Borodkin, A.M.Skripnik, A.Ia. Berman. TSvet.met.29 no.9:86-88 S '56. (MLRA 9:10)
(Nonferrous metals--Metallurgy) (Pervushin, S.A.)

APPROVED FOR RELEASE: 06/08/2000 CIA-RDP86-00513R000205010011-1"

"APPROVED FOR RELEASE: 06/08/2000 CIA-RDP86-00513R000205010011-1

BERMAN, A.Ye.

Water thermostat. Lab. delo no.10:638-640 '64.
(MIRA 17:12)

1. Volochiskaya rayonnaya bol'nitsa (glavnyy vrach M.S. Pakhol'chuk).

APPROVED FOR RELEASE: 06/08/2000 CIA-RDP86-00513R000205010011-1"

"APPROVED FOR RELEASE: 06/08/2000 CIA-RDP86-00513R000205010011-1

BERMAN, B.I.; AGENTOV, V.B.

Geochemical relations of the pyrite-complex metal mineralization of eastern Tuva to Lower Cambrian volcanism. Geokhimiia no.3:314-324 Mr '65. (MIRA 18:7)

1. Geologo-razvedochnyy institut im. S.Ordzhonikidze, Moskva.

APPROVED FOR RELEASE: 06/08/2000 CIA-RDP86-00513R000205010011-1"

"APPROVED FOR RELEASE: 06/08/2000 CIA-RDP86-00513R000205010011-1

BERMAN, B.I.; PROKHOROV, V.G.; KHAYRETDINOV, I.A.

Temperatures of the formation of pyrite-complex metal mineralization in eastern Tuva. Geol.rud.mestorozh. 7 no.4:63-75 Jl-Ag '65. (MIRA 18:8)

1. Moskovskiy geologorazvedochnyy institut im. Ordzhonikidze.

APPROVED FOR RELEASE: 06/08/2000 CIA-RDP86-00513R000205010011-1"

"APPROVED FOR RELEASE: 06/08/2000 CIA-RDP86-00513R000205010011-1

HERMAN, B.Yu., insh.

The baring of mountainous ore deposits by mass blowout explosions. Mekh.trud.rab. 11 no.8:33-36 Ag '57. (MIRA 10:11)
(Mining engineering)

APPROVED FOR RELEASE: 06/08/2000 CIA-RDP86-00513R000205010011-1"

"APPROVED FOR RELEASE: 06/08/2000 CIA-RDP86-00513R000205010011-1

BERMAN, B.Yu., inzh.

Efficiency promotion in the enterprises of the "Aleksandriiaugol'" trust. Izobr. i rats. 3 no.5:37-38 My '58. (MIRA 11:9)
(Kiev Province--Coal mines and mining)

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"APPROVED FOR RELEASE: 06/08/2000 CIA-RDP86-00513R000205010011-1

25887
S/069/61/023/004/002/003
B101/B215

15.9110

AUTHORS: Pechkovskaya, K. A., Senatorskaya, L. G., Berman, B. Z., Dogadkin, B. A.

TITLE: Reinforcement of rubber in latex. 7. Electron microscopic examination of filled latex mixtures

PERIODICAL: Kolloidnyy zhurnal, v. 23, no. 4, 1961, 462-463

TEXT: This report was made at the tret'ye Vsesoyuznoye soveshchaniye po elektronnoy mikroskopii (Third All-Union Conference on Electron Microscopy), Leningrad, October 1960. The second communication of this series was published in Trudy II konferentsii po lateksu, Leningrad 1958. The authors based their report on a paper by B. A. Dogadkin et al. (Kolloidn. zh. 18, no. 5, 528, 1956) which shows that a reinforcing action of carbon black in latex can be attained by adding a destabilizing substance (casein) to latex. Here, this effect was studied under an ЭМ-100 (EM-100) electron microscope having a magnifying power of approximately 20,000. Collodion, quartz, or carbon replicas of the latex film, frozen in liquid nitrogen, were prepared. It was found that 1) all latex films containing neither

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Reinforcement of...

carbon black nor casein had globar structures. 2) Addition of casein changed the structure. Part of the globuli disappeared, and a granular structure formed. Casein removes the protective covering of the globuli, thus allowing the latter to form a continuous polymer phase and to interact with carbon black. The contact area between polymer and carbon black is increased and, thus, causes reinforcement. 3) If the non-vulcanized, filled film was rolled, the last globuli disappeared. 4) Carbon black also had a destabilizing effect upon latex, although to a smaller extent than casein. Films with carbon black without casein contained less but larger globuli. 5) The number of globuli was reduced in the presence of carbon black and casein. [Abstracter's note: The electron microscopic pictures are irreproducible.] There are 1 figure and 2 Soviet-bloc references.

ASSOCIATION: Nauchno-issledovatel'skiy institut shinnoy promyshlennosti, Moskva (Scientific Research Institute of the Tire Industry, Moscow)

SUBMITTED: November 21, 1960

Card 2/2

APPROVED FOR RELEASE: 06/08/2000 CIA-RDP86-00513R000205010011-1"

"APPROVED FOR RELEASE: 06/08/2000 CIA-RDP86-00513R000205010011-1

BERMAN, D.Yu.; KUZ'MIN, I.F.

Asian snipe Capella stenura Bp. in Tuva. Ornitologiia no.7:209-216 '65. (MIRA 18:10)

APPROVED FOR RELEASE: 06/08/2000 CIA-RDP86-00513R000205010011-1"

"APPROVED FOR RELEASE: 06/08/2000 CIA-RDP86-00513R000205010011-1

BERMAN, D.I.

Midget pentadactyl jerboa Cardiocranius paradoxus Sat., a new species in the fauna of the U.S.S.R. Biul.MOIP.Otd.biol. 67 no.5:19-28 S-O '62. (MIRA 15:10)
(TANNU OLA RANGE--JERBOAS)

APPROVED FOR RELEASE: 06/08/2000 CIA-RDP86-00513R000205010011-1"

"APPROVED FOR RELEASE: 06/08/2000 CIA-RDP86-00513R000205010011-1

GIBET, L.A.; BERMAN, D.I.

Distribution of small forest birds in Kalinin Province after they have abadnoned their nests. Ornitologiia no.5:96-100 '62. (MIRA 16:2)

(Kalinin Province--Birds)

APPROVED FOR RELEASE: 06/08/2000 CIA-RDP86-00513R000205010011-1"

"APPROVED FOR RELEASE: 06/08/2000 CIA-RDP86-00513R000205010011-1

BERMAN, D.I.; ZABELIN, V.I.

New materials on the ornithofauna of Tuva. Ornitologiia no.6:153-160 '63. (MIRA 17:6)

APPROVED FOR RELEASE: 06/08/2000 CIA-RDP86-00513R000205010011-1"

"APPROVED FOR RELEASE: 06/08/2000 CIA-RDP86-00513R000205010011-1

BERMAN, D.I.; KOLONIN, G.V.

Nesting of the Himalayan finch Leucosticte nemoricola Hodgs. in Tuva. Ornitologiia no.6:268-271 '63. (MIRA 17:6)

APPROVED FOR RELEASE: 06/08/2000 CIA-RDP86-00513R000205010011-1"

"APPROVED FOR RELEASE: 06/08/2000 CIA-RDP86-00513R000205010011-1

GIBET, L.A.; ZHMAYEVA, Z.M.; BERMAN, D.I.

Birds and their role as fosterers of Ixodes persulcatus in a natural focus of the tick-borne encephalitis in Kalinin Province. Zool. zhur. 44 no.2:228-240 '65.

(MIRA 18:5)

1. Otdel infektsiy s prirodnoy ochagovost'yu Instituta epidemiologii i mikrobiologii AMN SSSR, Moskva.

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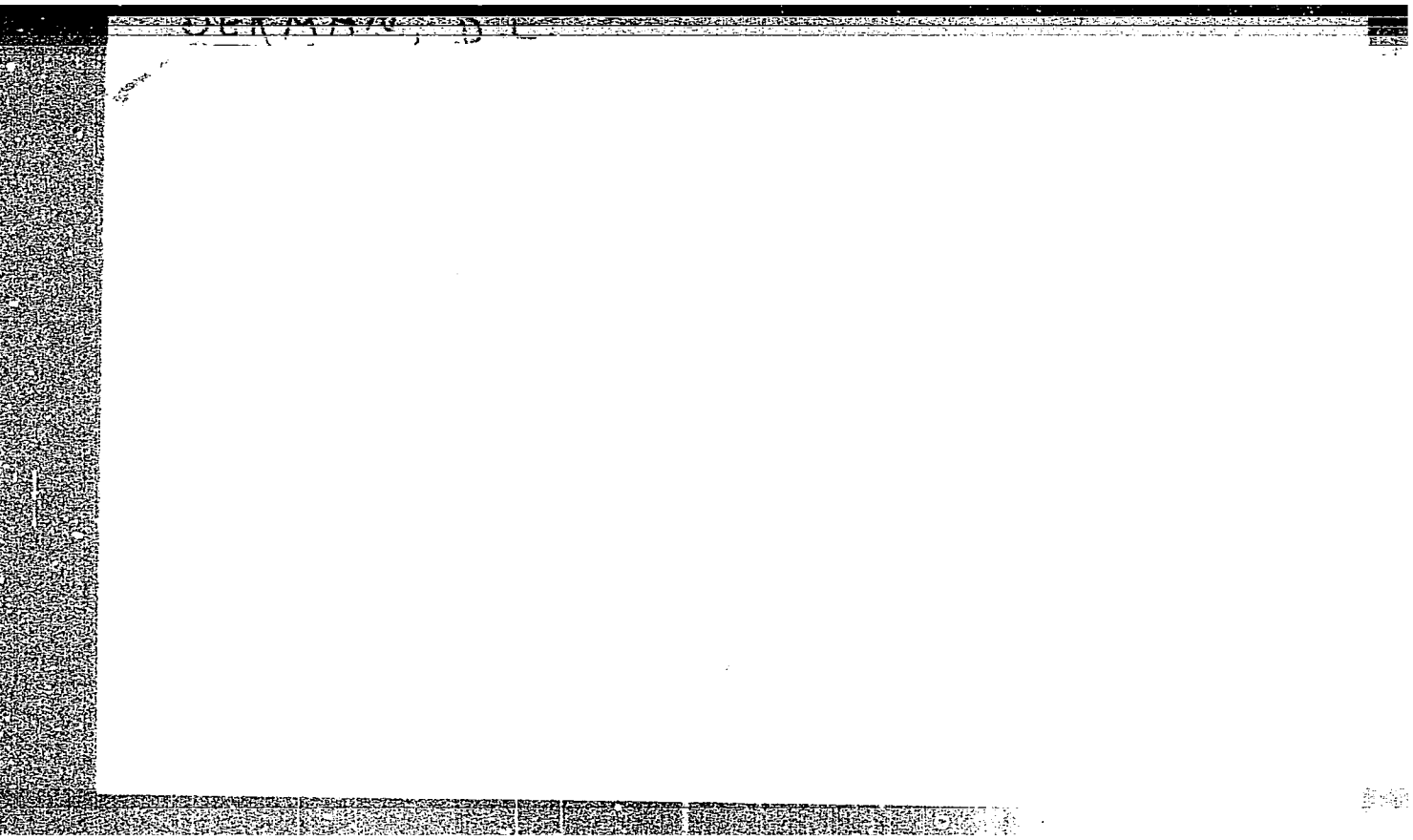

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BERMAN, D. L.

PA 26/49T63

USSR/Mathematics - Operational Theory Jan 49
Mathematics - Matrices

"The Convergence of Some Interpolated Operations," D. L. Berman, 4 pp

"Dok Ak Nauk SSSR" Vol LXIV, No 1

Proofs of three theorems concerning matrices derived from Jacobian functions. Submitted 3 Nov 48.

[redacted]

26/49T63

APPROVED FOR RELEASE: 06/08/2000 CIA-RDP86-00513R000205010011-1"

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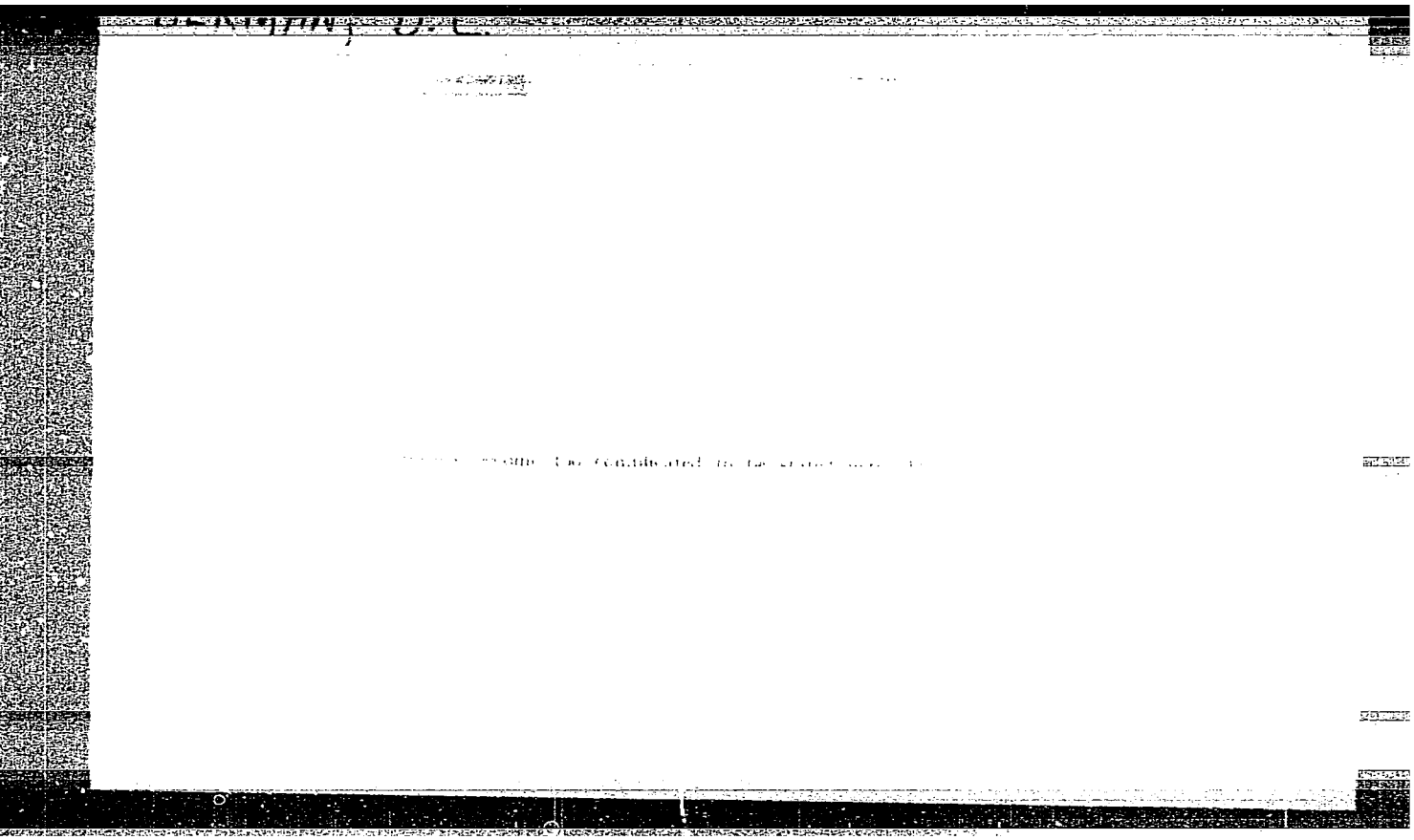

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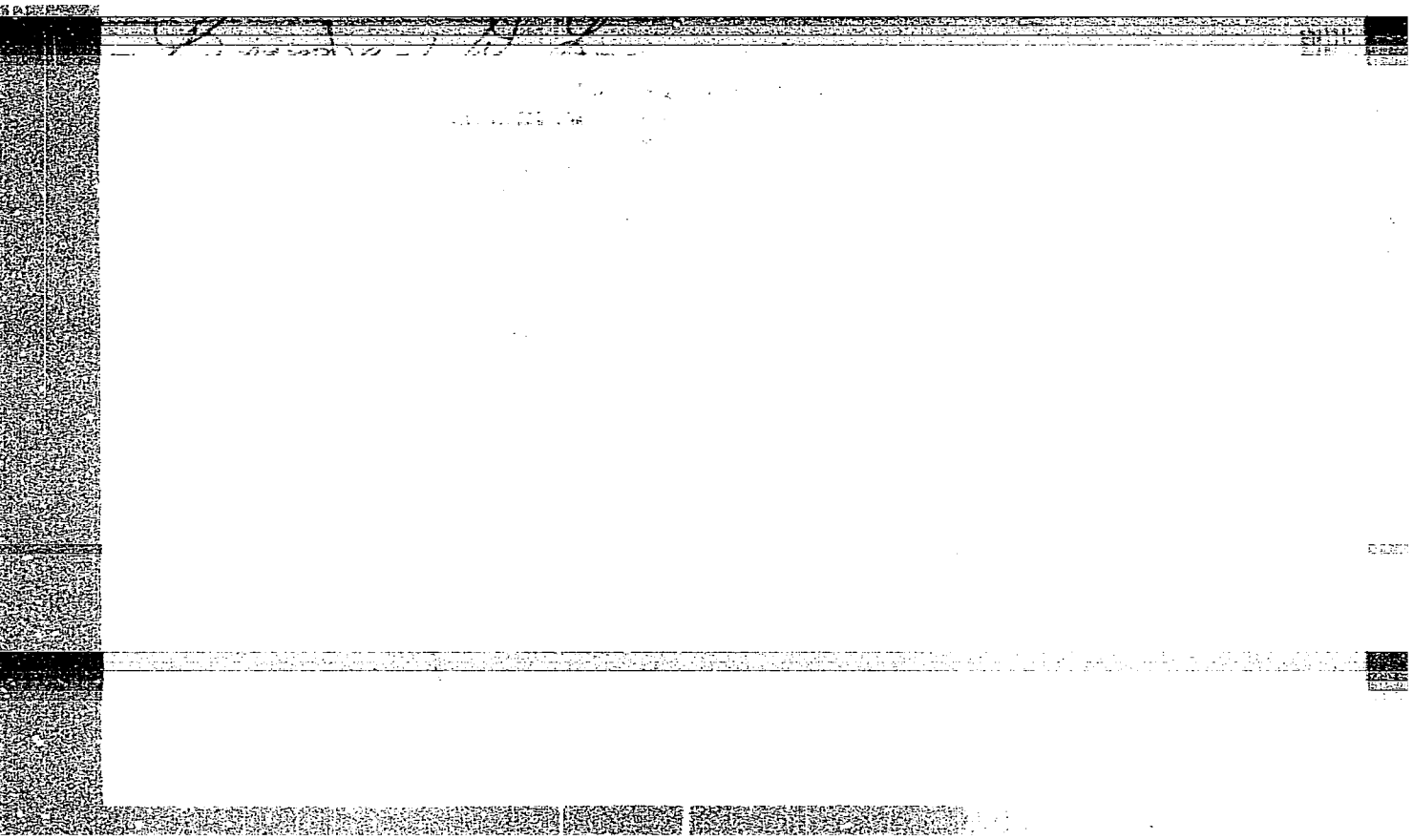

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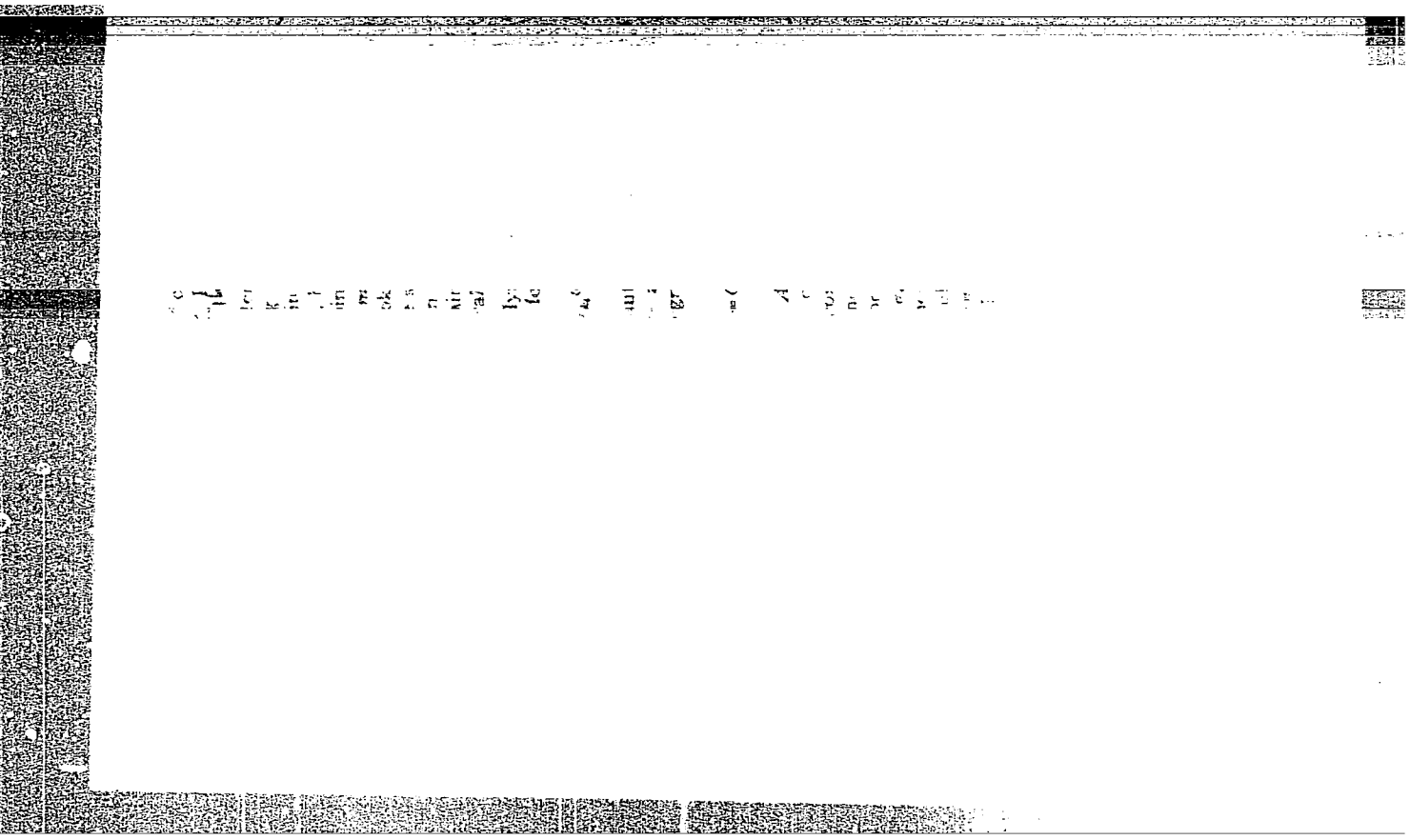

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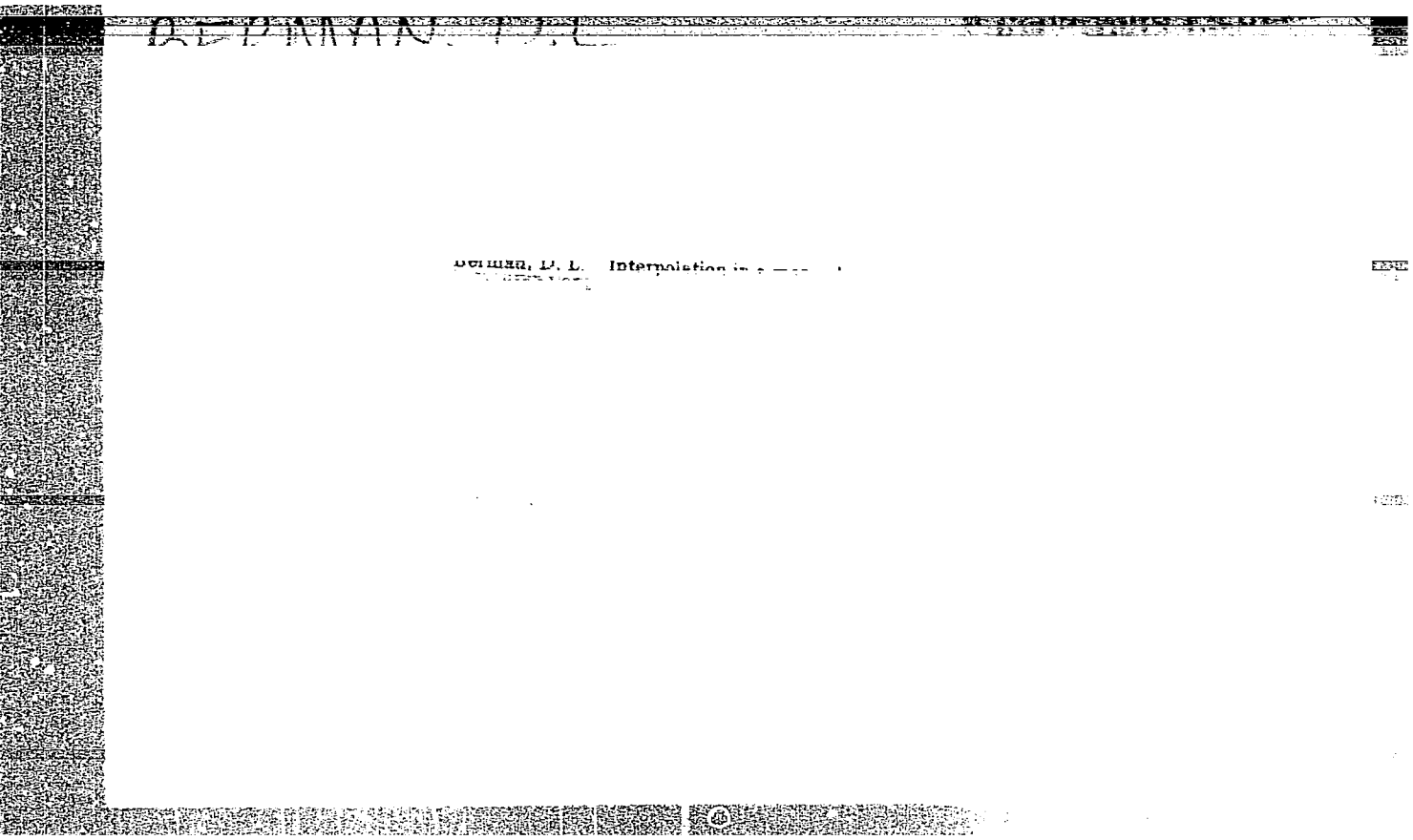

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"APPROVED FOR RELEASE: 06/08/2000 CIA-RDP86-00513R000205010011-1

BERMAN D.L.

On the es imate of derivatives of an algebraic polynomial
Dokl. AN SSSR 84, no. 2, 1952

APPROVED FOR RELEASE: 06/08/2000 CIA-RDP86-00513R000205010011-1"

"APPROVED FOR RELEASE: 06/08/2000 CIA-RDP86-00513R000205010011-1

USSR/Mathematics - Operations, Linear 1 Jul 52

"A Class of Linear Operations," D. L. Berman

"Dok Ak Nauk SSSR" Vol LXXXV, No 1, pp 13-16

$\tilde{C}$ designates the space of all continuous 2π-periodic functions $f(x)$ with the norm $//f// = \max |f(x)|$ $(0 \le x \le 2\pi)$; also designate $f(x+t) = f_t(x)$. $U(f,x)$ is called a linear trigonometric polynomial operation of order n of type Φ if $U(f,x)$ satisfies the conditions: U is a linear operator carrying $\tilde{C}$ into $\tilde{C}$; for any f in $\tilde{C}$, U is a trigonometric polynomial of order not greater than n; for any trigonometric polynomial $T(x)$ we have $U = \int_0^{2\pi} T(x+t)\Phi(t)dt = \sigma_n(t,x)$. 224T80

where $\Phi(t)$ is a given trigonometric polynomial of order n. Gives various examples of ltpo n/Φ (i.e., linear trigonometric polynomial operations of order n of type Φ). Submitted by Acad A. N. Kolmogorov. 28 Apr 52.

BERMAN, D.L.

244T80

APPROVED FOR RELEASE: 06/08/2000 CIA-RDP86-00513R000205010011-1"

"APPROVED FOR RELEASE: 06/08/2000 CIA-RDP86-00513R000205010011-1

USSR/Mathematics - Approximate Inter- 21 Jul 52
polation

"Approximation, by Interpolational Polynomials, of Functions Satisfying the Lipschitz Condition," D. L. Berman

"Dok Ak Nauk SSSR" Vol 85, No 3, pp 461-464

Consider the n-line matrix consisting of the roots of the Chebyshev polynomial $T_n(x) = \cos n \arccos x$. Studies the fundamental Lagrange polynomials $(l_k(x))_{k=1}^{n}$ constructed from the n-line matrix; also the interpolational polynomial of S. N. Bernshteyn of degree n-1 constructed for the same n-line

235T65

matrix and for function f(x) defined in interval (-1, 1), namely polynomial $A_n(f;x)$. Acknowledges help of I. P. Natonson. Submitted by Acad V. I. Smirnov 12 May 52.

235T65

BERMAN, D. L.

APPROVED FOR RELEASE: 06/08/2000 CIA-RDP86-00513R000205010011-1"

"APPROVED FOR RELEASE: 06/08/2000 CIA-RDP86-00513R000205010011-1

BERMAN, D. L.

USSR/Mathematics - Interpolation 11 Nov 52

"The Solution of an Extremal Problem in the Theory of Interpolation," D. L. Berman

"Dok Ak Nauk SSSR" Vol 87, No 2, pp 167-170

Considers an arbitrary sequence of monotonic increasing numbers between -1 and 1. Constructs the corresponding fundamental interpolational Lagrange polynomials for the sequence of numbers (m). Finally investigates the maximum (for x in interval $[-1,1]$) of the sum of absolute values of the mentioned polynomials. The problem is to find the infimus of this

245T71

sum for arbitrary index and to indicate the corresponding points mo. Submitted by Acad S. N. Bernshteyn 15 Sep 52.

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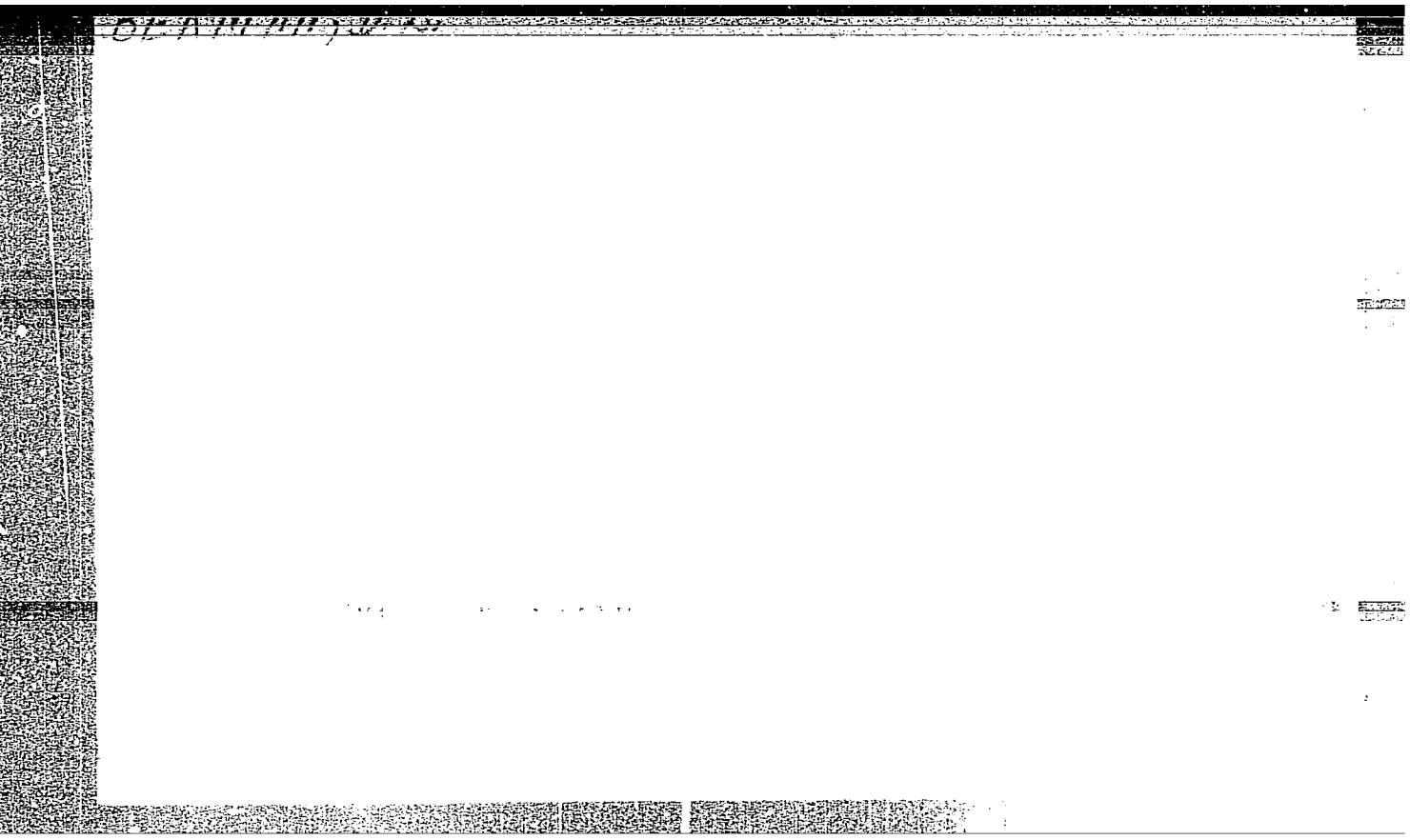

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"APPROVED FOR RELEASE: 06/08/2000 CIA-RDP86-00513R000205010011-1

BERMAN, D. L. 1 Jan 53

USSR/Mathematics - Functionals

"Linear Trigonometric Polynomial Operations in Certain Functional Spaces," D. L. Berman

DAN SSSR, Vol 88, No 1, pp 9-12

Discusses functional space E Satisfying specified axioms: elements of E are 2π-periodic functions summable inthe interval $(-\pi, \pi)$; E is a linear normed space: if f(x) is in E, then f(x+t) is in E; usual conditions governing boundedness hold. Cites related works of S. M. Lozinskiy, DAN SSSR, 61, No 2 (1948); 64, No 4(1949). Presented by Acad A. N. Kolmogorov 20 Oct 52.

262T60

APPROVED FOR RELEASE: 06/08/2000 CIA-RDP86-00513R000205010011-1"

"APPROVED FOR RELEASE: 06/08/2000 CIA-RDP86-00513R000205010011-1

BERMAN, D. L.

USSR/Mathematics - Approximation 21 Aug 53

"Approximation of Periodic Functions by Linear Trigonometric Polynomial Operations," D. L. Berman

DAN SSSR, Vol 91, No 6, pp 1249-1252

States that U(f) is called a linear trigonometric polynomial operation of order n of type Φ if it transforms a functional space E into itself, is a trigonometric polynomial of order not higher than n, and the equality $U(T,x) - \int_0^{2\pi}(x+t)\Phi(t)dt = \sigma_n(T,x)$ holds (here T(x) is any trigonometric polynomial of of order not higher than n and Φ is a given

275T74

trigonometric polynomial of order n). The simplest such operation is $\int_0^{2\pi} f(x+t)\Phi(t)dt = \sigma_n(f,x)$. Partial cases of such operations have been given by S. M. Lozinskiy (DAN 61, No 2, 1948; 64, No 4, 1949). Presented by Acad A. N. Kolmogorov 27 Jun 53.

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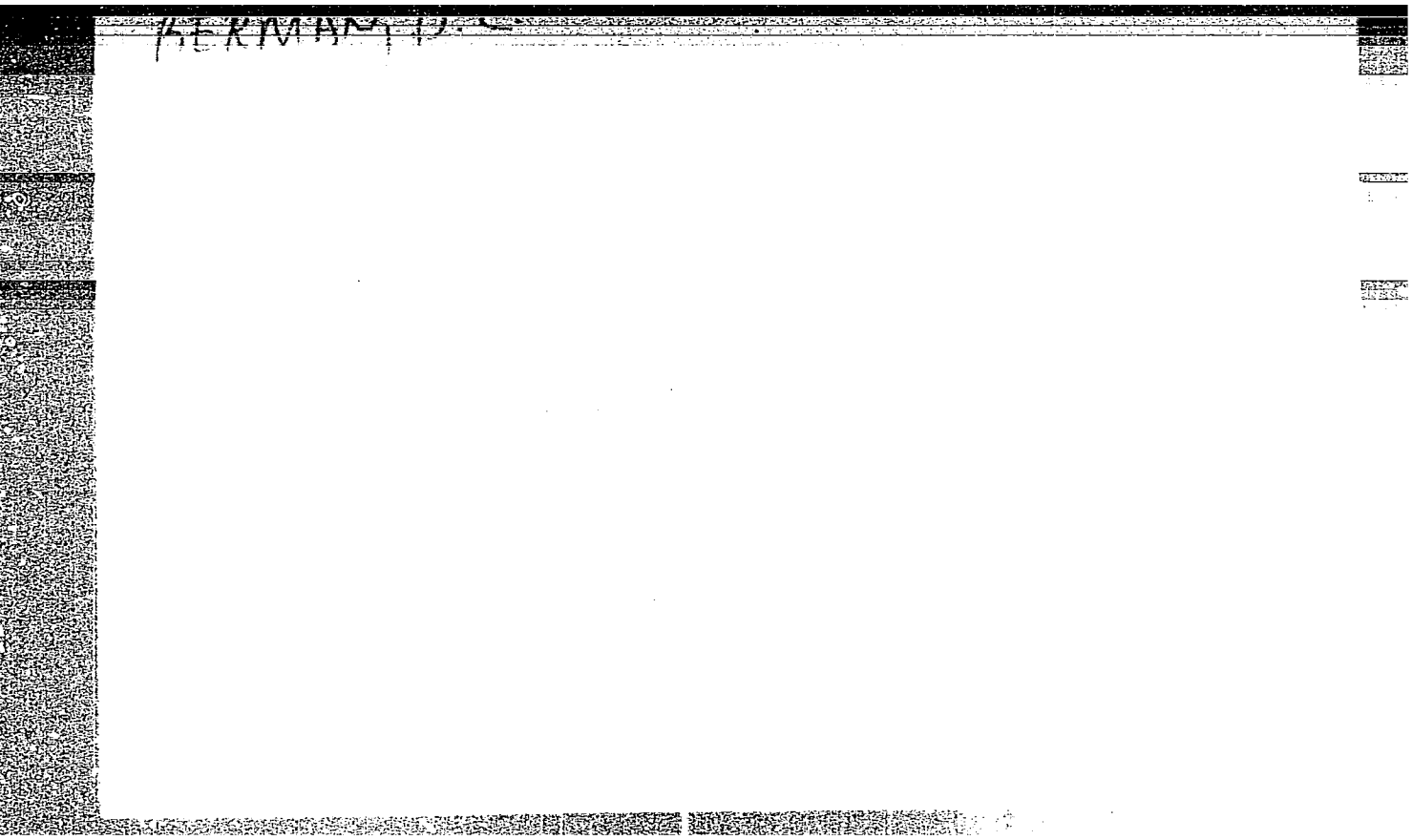

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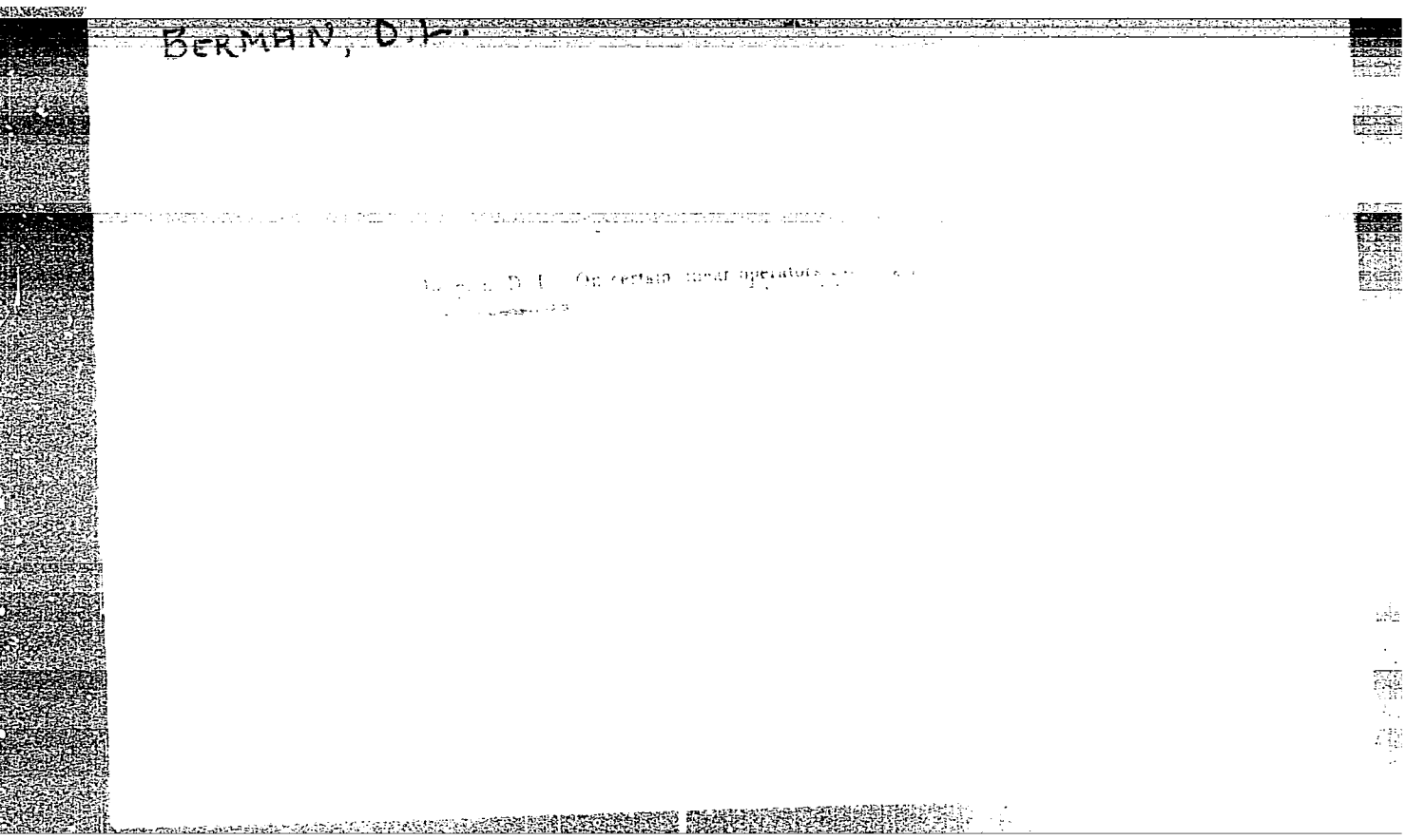

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"APPROVED FOR RELEASE: 06/08/2000 CIA-RDP86-00513R000205010011-1

BERMAN, D. L.

USSR/Mathematics - Bernshteyn polynomials

Card 1/1 Pub. 22 - 1/49

Authors : Berman, D. L.

Title : Approximation of continuous functions by the Bernshteyn interpolational polynomials

Periodical : Dok. AN SSSR 101/3, 397-400, Mar 21, 1955

Abstract : A method of calculating continuous functions in the limits (- 1, 1) is presented. The method consits in the use of Bernshteyn's interpolational polynomials. Analytical expression of the Bernshteyn polynomials and their properties are presented. Three USSR references (1948-1954).

Institution : State Pedagogical Institute, Novgorod

Presented by: Academician A. N. Kolmogorov, December 14, 1954

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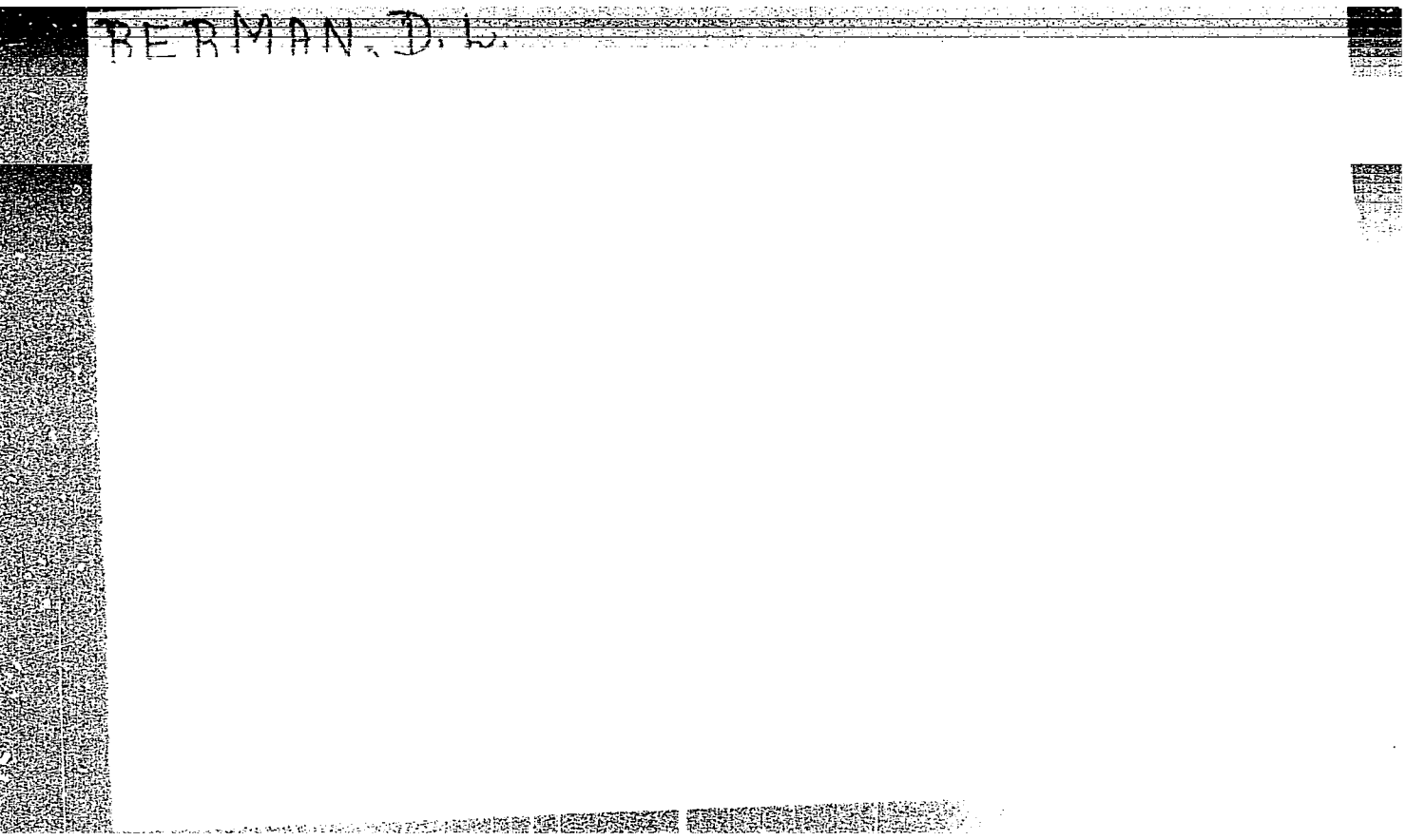

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SUBJECT USSR/MATHEMATICS/Theory of approximations CARD 1/3 PG - 378
AUTHOR BERMAN D.L.
TITLE On a new method for the construction of Weierstrassian interpolation formulas.
PERIODICAL Doklady Akad. Nauk 109, 679-682 (1956)
reviewed 11/1956

If C is the space of all functions being defined and continuous on $[-1,+1]$, $\|f\| = \max_{-1\leq x\leq 1} |f(x)|$ and if

$$-1 \leq x_n^{(n)} < x_{n-1}^{(n)} < \ldots < x_1^{(n)} \leq 1 \qquad n=1,2,3,\ldots$$

is a triangular matrix of numbers, then the linear operaton $U_{n,m}(f)$ from C to C is called a Weierstrassian interpolation formula if

1) $U_{n,m}(f)$ for every $f \in C$ is an algebraic polynomial of degree $\leq m$
2) for $k=1,2,\ldots,n$ there exist the equations $U_{n,m}(f,x_k^{(n)}) = f(x_k^{(n)})$
3) for every $f \in C$ holds: $\|U_{n,m}(f) - f\| \to 0$ for $m \to \infty$, $n \to \infty$.

Joining some questions of Bernštejn and an own paper (Doklady Akad. Nauk 60, 3, (1948)) the author constructs an extensive class of $U_{n,m}$-operations which satisfy the inequation $1 + \delta_1 < \frac{m}{n} < 1 + \delta_2$ for arbitrarily small positive fixed δ_1 and δ_2. Let $T_k(x) = \cos k \arccos x$ and

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Doklady Akad. Nauk 109, 679-682 (1956) CARD 2/3 PG - 378

$$A_j = A_j^{(n)}(f) = \frac{2}{n}\sum_{k=1}^{n} f(x_k^{(n)})T_j(x_k^{(n)}) \qquad j=0,1,2,\ldots,n-1,$$

where $x_k^{(n)} = \cos\frac{2k-1}{2n}\pi$, $k=1,2,\ldots,n$, $n=1,2,\ldots$. Let be given the numbers

$$(1) \qquad \lambda_{2n-m}^{(m)}, \lambda_{2n-m+1}^{(m)}, \ldots, \lambda_{n-1}^{(m)}, \lambda_{n+1}^{(m)}, \ldots, \lambda_m^{(m)}, \qquad \lambda_k = \lambda_{2n-k}=1 \quad k=2n-m,\ldots,(n-1).$$

Then the author defines

$$(2) \qquad U_{n,m}(f) = \frac{A_0}{2} + \sum_{k=1}^{2n-m-1} A_k T_k(x) + \sum_{k=2n-m}^{n-1} \lambda_k^{(m)} A_k T_k(x) - \sum_{k=n+1}^{m}{}' \lambda_k^{(m)} A_{2n-k} T_k(x).$$

Then the following theorems are formulated: 1. The points $x_k^{(n)}$ of the n-th row of the matrix $\{x_k^{(n)}\}$ are nodes of (2) for every sequence (1). 2. For every sequence (1), (2) has the property that for every polynomial of degree (2n-m) the identity $U_{n,m}(P) \equiv P(x)$ is valid. 3. If (1) for arbitrary m satisfies the inequations

$$(4) \qquad |\lambda_m| < \frac{C_1}{\ln m}, \quad |\Delta\lambda_{m-1}| < C_2, \quad \sum_{k=2n-m}^{m-1}{}' |\Delta^2\lambda_k| < \frac{C_3}{2n+1}$$

C_i - constants; Δ, Δ^2 - differences of first and second order respectively.

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and $1+\delta_1<\frac{m}{n}<1+\delta_2$, then for every $f\in C$ the relation

(5) $$\|U_{n,m}(f)-f\|\to 0 \quad \text{as } m,n\to\infty$$

is valid. 4. If a polynomial $P(x)$ of smaller than $(2n-m)$-th degree in the points $x_k^{(n)}=\cos\frac{2k-1}{2n}\pi$ satisfies the inequations $|P(x_j^{(n)})|\leq 1$ $(j=1,2,\dots,n)$, then for all $x\in[-1,+1]$: $|P(x)|\leq\frac{1}{n}\inf_s\sum_{j=1}^{n}|T_{n,m}(\theta+\theta_j)+T_{n,m}(\theta-\theta_j)|$, where inf is taken over all possible sequences (1). 5. If (1) satisfies the condition (4) for every m and if for every m: $$|\Delta^2\lambda_k^{(m)}|\leq\frac{C_4}{n^{1+\varepsilon}}\left[\frac{1}{(m-k)^{1-\varepsilon}}+\frac{1}{(m-2n+1+k)^{1-\varepsilon}}\right],$$

$2n-m\leq k\leq m-1$, k/n, $C_4=\text{const}$, $\varepsilon>0$ and if $1+\delta_1<\frac{m}{n}<1+\delta_2$, then for every $f\in C$ the relation (5) is valid. 6. If the coefficients of $T_{n,m}(t)$ for every m form a convex sequence and if m and n satisfy the relation $1+\delta_1<\frac{m}{n}<1+\delta_2$, then for the validity of (5) it is necessary and sufficient that

$$\sum_{k=2n-m}^{m}{}'\frac{\lambda_k^{(m)}}{m+1-k}=O(1).$$

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BERMAN, D. L.

SUBJECT USSR/MATHEMATICS/Functional analysis CARD 1/4 PG - 640
AUTHOR BERMAN D.L.
TITLE On the moment problem for a finite interval.
PERIODICAL Doklady Akad.Nauk 109, 895-898 (1956)
reviewed 3/1957

Starting from a certain general class of polynomial operators the author considers the moment problem. In $[0,1]$ let be given the point matrix

$$0 \leq x_0^{(n)} < x_1^{(n)} < \ldots < x_n^{(n)} \leq 1 \qquad n=0,1,2,\ldots .$$

Let C be the space of functions being continuous on $[0,1]$. Let the operator $H_n(f,x)$ have the following properties: 1)

$$H_n(f,x) = \sum_{j=0}^{n} f(x_j^{(n)}) h_j^{(n)}(x),$$

where $h_j^{(n)}(x)$ are polynomials of at most n-th degree and

$$h_j^{(n)}(x) \geq 0 \qquad j=0,1,\ldots,n; \quad n=0,1,2,\ldots \qquad 0 \leq x \leq 1.$$

2) If p(x) has the degree $m \leq \varphi_0(n)$ ($\varphi_0(n)$ an integral function, $n \geq \varphi_0(n)$

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and $\varphi_o(n) \longrightarrow \infty$ for $n \longrightarrow \infty$), then $H_n(p,x)$ is a polynomial of at most m-th degree. 3) For every $f \in C$ in $[0,1]$ uniformly: $H_n(f,x) \longrightarrow f(x)$ for $n \longrightarrow \infty$. Let further $\{\mu_k\}_{k=o}^{\infty}$ be a given sequence. Let σ_n be a functional in the space of all polynomials of at most n-th degree, where

$$\sigma_n(p_n(x)) = a_o\mu_o + a_1\mu_1 + \dots + a_n\mu_n$$

if $p_n(x) = a_o + a_1x + \dots + a_nx^n$.

Without proof the author formulates some theorems; e.g.: in order that for n=0,1,2,... and a measurable function $\varphi(x)$ there exists the relation $\mu_n = \int_o^1 x^n\varphi(x)dx$ it is necessary and sufficient that for all n there holds the inequation

$$|\sigma_n(h_j^{(n)}(x))| \leq c_2\int_o^1 h_j^{(n)}(x)dx, \qquad j=0,1,2,\dots n, \qquad n=0,1,2,\dots,$$

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where C_2 does not depend on n.

Putting $H_n(f,x) = \sum_{k=0}^{n} f(\frac{k}{n}) C_n^k x^k (1-x)^{n-k}$, then from these and other formulated results one obtains the results of Hausdorff (Math.Z. 16, 220 (1923)). Furthermore in this case

$$h_j^{(n)}(x) = \sum_{k=0}^{n} a_k^{(j)} x^k = C_n^j x^j (1-x)^{n-j}; \quad \sigma_n\left[h_j^{(n)}(x)\right] = C_n^j \sum_{k=0}^{n-j} (-1)^k C_{n-j}^k \mu_{j+k} = C_n^i \Delta^{n-j} \mu_j.$$

From the mentioned results of Hausdorff and the present theorems there follows:

1. The inequations $\sum_{k=0}^{n} a_k^{(j)} \mu_k \geq 0$ and $\Delta^n \mu_k \geq 0$ are equivalent.

2. If there exists a C_4 = const for which $\sum_{j=0}^{n} C_n^j |\Delta^{n-j} \mu_j| \leq C_4$, then there also exists a C_5 = const for which $\sum_{j=0}^{n} \left| \sum_{k=0}^{n} a_k^{(j)} \mu_k \right| \leq C_5$ and reversely.

3. If there exists a C_6 = const for which

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Doklady Akad.Nauk 109, 895-898 (1956) CARD 4/4 PG - 640

$$(n+1)c_n^k\left|\Delta^{n-k}\mu_k\right| \leq C_6 \qquad k=0,1,\ldots,n \;; \qquad n=0,1,2,\ldots,$$

then there also exists a C_7 = const for which

$$\left|\sum_{k=0}^{n} a_k^{(j)}\mu_k\right| \leq C_7 \sum_{k=0}^{n} \frac{a_k^{(j)}}{k+1} \qquad n=0,1,2,\ldots$$

and reversely.

4. If there exists a constant C_8 for which $(n+1)\sum_{k=0}^{n}\left[c_n^k\Delta^{n-k}\mu_k\right]^2 \leq C_8$, then there exists a constant C_9 for which

$$\sum_{j=0}^{n} \frac{\left(\sum_{k=0}^{n} a_k^{(j)}\mu_k\right)^2}{\sum_{k=0}^{n} \frac{a_k^{(j)}}{k+1}} \leq C_9 .$$

INSTITUTION: Educational Institute, Novgorod.

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SUBJECT USSR/MATHEMATICS/Theory of approximations CARD 1/2 PG - 502
AUTHOR BERMAN D.L.
TITLE The velocity of convergence of the interpolation process of S.N.Bernštejn and Hermite-Fejér for some classes of knots.
PERIODICAL Doklady Akad.Nauk 109, 1087-1090 (1956)
reviewed 1/1957

Let the knot matrix

(1) $$-1 \leqslant x_1^{(n)} < x_2^{(n)} < \ldots < x_n^{(n)} \leqslant 1 \qquad n=1,2,\ldots$$

possess the properties: A) For every $x \in [-1,+1]$ the following inequations are satisfied:

$$|l_k^{(n)}(x)| \leqslant |l_{k+1}^{(n)}(x)| \quad \text{for} \quad x_k^{(n)} < x_{k+1}^{(n)} \leqslant x \qquad (n = n_0, n_0+1, \ldots)$$

$$|l_k^{(n)}(x)| \geqslant |l_{k+1}^{(n)}(x)| \quad \text{for} \quad x \leqslant x_k^{(n)} < x_{k+1}^{(n)} \qquad (n = n_0, n_0+1, \ldots),$$

where $\{l_k^{(n)}(x)\}_{k=1}^{n}$ are Lagrange's fundamental polynomials of the n-th row of (1) B) If $\sigma(a,b)$ is the number of the knots of the n-th row of (1) which

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Doklady Akad.Nauk 109, 1087-1090 (1956) CARD 2/2 PG - 502

satisfy the inequations $a \leq x_j^{(n)} \leq b$, then for $\sigma(x, x_j^{(n)}) = h$ there holds the inequation $|l_j^{(n)}(x)| < K \varphi(h)$, $n = n_0, n_0+1, \ldots$, K constant, $\varphi(h) \geq 0$ an arbitrary decreasing function, where $\varphi(h) \to 0$, $h \to \infty$.

In seven theorems the author formulates some results on the velocity of convergence of Bernštejn's process with knot matrices (1) which possess the properties A and B, and on the velocity of convergence of the Hermite-Fejér's processes with ϱ-normal matrices (Fejér, Math.Ann. 106, 1, (1932)).

INSTITUTION: Educational Institute, Novgorod.

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BERMAN, D. L.

JPRS/DC-331
CSO DC-1914

Name	:	BERMAN, D. L.
Dissertation	:	Investigation on the theory of approximation of a function by interpolation polynomials
Degree	:	Doc Phys-Math Sci
Defended At	:	Moscow State U imeni Lomonosov
Publication Date, Place	:	1956, Moscow
Source	:	Knizhnaya Letopis' No 6, 1957

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BERMAN, D.L.

Distribution of basic points in the S.N.Bernstein interpolation process. Izv.vys.ucheb.zav.; mat. no.1:35-43 '57.
(MIRA 12:10)

1. Novgorodskiy pedagogicheskiy institut.
(Interpolation)

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BERMAN, D.L.

SUBJECT USSR/MATHEMATICS/Theory of approximations CARD 1/3 PG - 713
AUTHOR BERMAN D.L.
TITLE The convergence of the Lagrange's interpolation process for absolutely continuous functions and for functions of bounded variation.
PERIODICAL Doklady Akad.Nauk 112, 9-12 (1957)
reviewed 4/1957

The author proves some theorems which are generalizations of just published results of Krylov (Doklady Akad.Nauk 105, no.3; 107, no.3 (1956)). Let be given a triangular knot matrix

$$(1) \qquad -1 \leq x_1^{(n)} < x_2^{(n)} < \ldots < x_n^{(n)} \leq 1 \qquad (n=1,2,\ldots).$$

Let $\nu(a,b)$ be the number of knots of the n-th row of (1) which satisfy the inequations $a \leq x_j^{(n)} \leq b$. Let

$$\omega_n(x) = \prod_{j=1}^{n} (x-x_j^{(n)}), \qquad l_j^{(n)}(x) = \frac{\omega_n(x)}{(x-x_j^{(n)}) \cdot \omega_n'(x_j^{(n)})} \qquad (j=1,2,\ldots n; \; n=1,2,\ldots)$$

and let be constructed the Lagrange's interpolation polynomial

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$$L_n(f,x) = \sum_{k=1}^{n} f(x_k^{(n)}) \cdot l_k^{(n)}(x)$$

for the function f. Then, among others, the following theorems are proved:
1. Let the matrix (1) satisfy the conditions
A) for every $x \in [-1,+1]$ there hold the inequations:

for $x_k^{(n)} < x_{k+1}^{(n)} \leq x$ we have $|l_k^{(n)}(x)| \leq |l_{k+1}^{(n)}(x)|$ $n=n_0, n_0+1, \ldots$

for $x \leq x_k^{(n)} < x_{k+1}^{(n)}$ we have $|l_k^{(n)}(x)| \geq |l_{k+1}^{(n)}(x)|$ $n=n_0, n_0+1, \ldots$

B) there exists a non-negative decreasing function $\varphi(h)$, where $\varphi(h) \to 0$ for $h \to \infty$ which has the property that if $\delta(x, x_k^{(n)}) = h$, then $|l_k^{(n)}(x)| \leq N\varphi(h)$ $(n=n_0, n_0+1, \ldots)$, $-1 \leq x \leq 1$, N is a finite non-negative number.

If then f(x) is an absolutely continuous function, then on $[-1,+1]$, $L_n(f,x)$ converges uniformly to f(x).

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Doklady Akad.Nauk 112, 9-12 (1957) CARD 3/3 PG - 713

2. If (1) satisfies the conditions A and B and if $f(x)$ is of bounded variation on $[-1,+1]$, then $L_n(f,x) \rightarrow f(x)$, $n \rightarrow \infty$ in all continuous points of $f(x)$.

INSTITUTION: Educational Institute, Novgorod.

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"APPROVED FOR RELEASE: 06/08/2000 CIA-RDP86-00513R000205010011-1

16(1),16(2)
AUTHOR: Berman, D.L. SOV/155-58-2-4/47

TITLE: Application of Interpolation Operators in the Theory of the Summation of Series (Primeneniye interpolyatsionnykh operatorov k teorii summirovaniya ryadov)

PERIODICAL: Nauchnyye doklady vysshey shkoly. Fiziko-matematicheskiye nauki, 1958, Nr 2, pp 17-19 (USSR)

ABSTRACT: The classical results of Hausdorff [Ref 2] on the momentum problem were generalized by the author [Ref 1] some years ago. In the present paper the summation method of Hausdorff connected with [Ref 2] is extended.

Let $0 \leq x_0^{(n)} < x_1^{(n)} < \ldots < x_n^{(n)} \leq 1$. Let the operator $H_n(f,x) = \sum_{j=0}^{n} f(x_j^{(n)}) h_j^{(n)}(x)$, where $h_j^{(n)}(x) \geq 0$ is a polynomial of at most n-th degree, have the properties 1) if $P(x)$ is a polynomial of degree $m \leq \varphi_0(n)$, $n \geq \varphi_0(n)$ and $\varphi_0(n) \to \infty$ with $n \to \infty$, then $H_n(P,x)$ is a polynomial of at most m-th degree; 2) for every $f \in C$ on $[0,1]$ it holds uniformly $H_n(f,x) \to f(x)$ for $n \to \infty$. Let

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Application of Interpolation Operators in the Theory of the Summation of Series SOV/155-58-2-4/47

(1) $\{\mu_k\}_{k=0}^{\infty}$

be a sequence and $\sigma_n[P_n(x)] = a_0\mu_0+\ldots+a_n\mu_n$ be a functional where $P_n(x) = a_0+a_1x+\ldots+a_nx^n$. Let $\lambda_j^{(n)} = \sigma_n[h_j^{(n)}(x)]$. For the sequence $\{S_k\}_{k=0}^{\infty}$ the matrix $T = \|\lambda_j^{(n)}\|$ defines a summation method

(2) $$t_n = \sum_{j=0}^{n} \lambda_j^{(n)} S_j.$$

Theorem: In order that (2) is regular it is necessary and sufficient that $\mu_0 = 1$, $\lim_{n\to\infty} \lambda_j^{(n)} = 0$,

(3) $$\sum_{j=0}^{n} |\lambda_j^{(n)}| < C.$$

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"APPROVED FOR RELEASE: 06/08/2000 CIA-RDP86-00513R000205010011-1

Application of Interpolation Operators in the Theory of the Summation of Series SOV/155-58-2-4/47

Definition: (1) is called σ-absolutely monotone if $\lambda_j^{(n)} \geqslant 0$.

Theorem: In order that (1) satisfies the condition (3) it is necessary and sufficient that $\mu_k = \alpha_k - \beta_k$, where $\{\alpha_k\}$ and $\{\beta_k\}$ are σ-absolutely monotone sequences.

There are 4 references, 2 of which are Soviet, 1 English, and 1 German.

ASSOCIATION: Novgorodskiy gosudarstvennyy pedagogicheskiy institut (Novgorod State Pedagogical Institute)

SUBMITTED: October 23, 1957

Card 3/3

APPROVED FOR RELEASE: 06/08/2000 CIA-RDP86-00513R000205010011-1"

"APPROVED FOR RELEASE: 06/08/2000 CIA-RDP86-00513R000205010011-1

16(1)
AUTHOR: Berman, D.L.

SOV/155-58-2-5/47

TITLE: Linear Polynomial Operations on Groups and on a Closed Interval. (Lineynyye polinomial'nyye operatsii na gruppakh i na segmente)

PERIODICAL: Nauchnyye doklady vysshey shkoly. Fiziko-matematicheskiye nauki, 1958, Nr 2, pp 20-23 (USSR)

ABSTRACT: Let C be the space of functions $f(x)$ continuous on the interval $[-1,1]$, $\|f\| = \max_{-1 \le x \le 1} |f(x)|$. Let $\tilde{f}(\theta) = f(\cos\theta)$, $x = \cos\theta$, $g_t(\theta) = \frac{\tilde{f}(\theta+t)+\tilde{f}(\theta-t)}{2}$. $V(f,x)$ is called the linear polynomial operation of degree n and of the type P (symbol: LPO n/P) if 1) $V(f,x)$ is a linear operation of C into C, 2) $V(f,x)$ is an algebraic polynomial of n-th degree for every $f \in C$, 3) for every polynomial $R(x)$ of at most n-th degree it holds:

$$V(R,x) = \int_{-\pi}^{\pi} \tilde{R}(\theta+t)P(t)dt, \qquad x = \cos\theta,$$

where $P(t)$ is a given cosine polynomial of at most n-th degree. Theorem:

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Linear Polynomial Operations on Groups and on a Closed Interval SOV/155-58-2-9/47

$$\frac{1}{2\pi}\int_0^{2\pi}\tilde{V}(g_t,\theta-t)dt = \frac{\sigma(f,x)}{2} + \frac{1}{4\pi}\int_{-\pi}^{\pi}\sigma(\tilde{f}\theta-2t)dt,$$

where

$$\sigma(f,\theta)\equiv\sigma(f,x) = \int_{-\pi}^{\pi}\tilde{f}(\theta+t)P(t)dt, \qquad x = \cos\theta.$$

Theorem: If $P(t) = \sum_{j=o}^{n} k_j D_j(t)$, where $\mathfrak{M} = \{k_j\}$ is a number sequence and $D_j(t)$ is the Dirichlet kernel of order j, then

$$\|V\| \geq \frac{L_n^{\mathfrak{M}}}{2} - \frac{1}{2}\left|\sum_{j=o}^{n} k_j\right|,$$

where L_n is the lebesgue constant of the summation method of $\mathfrak{M}$.

Three similar theorems for linear polynomial operations on groups are formulated also without a proof. The comprehension is rendered difficult by a misprint.
There are 9 references, 8 of which are Soviet, and 1 German.

ASSOCIATION: Novgorodskiy gosudarstvennyy pedagogicheskiy institut (Novgorod State Pedagogical Institute)
SUBMITTED: December 23, 1957
Card 2/2

APPROVED FOR RELEASE: 06/08/2000 CIA-RDP86-00513R000205010011-1"

"APPROVED FOR RELEASE: 06/08/2000 CIA-RDP86-00513R000205010011-1

AUTHOR: Berman, D.L.

SOV/140-58-6-4/27

TITLE: Approximation of Non-Periodic Functions by Interpolation Polynomials (Priblizheniye neperiodicheskikh funktsiy interpolyatsionnymi mnogochlenami)

PERIODICAL: Izvestiya vysshikh uchebnykh zavedeniy. Matematika, 1958, Nr 6, pp 30-35 (USSR)

ABSTRACT: Given the node matrix

(1) $-1 \leq x_1^{(n)} < x_2^{(n)} < \ldots < x_n^{(n)} \leq 1, \quad n=1,2,\ldots$

and a function $f(x)$ defined on $[-1,1]$, where

$$|f(x_2)-f(x_1)| \leq |x_2-x_1|, \quad x_1, x_2 \in [-1,1].$$

Let $L_n(f,x)$ be the Lagrange interpolation polynomial of degree $(n-1)$ for the n-th row of (1) and $f(x)$; then

$$L_n(f,x) = \sum_{k=1}^{n} f(x_k^{(n)}) l_k^{(n)}(x),$$

where $\{l_k^{(n)}(x)\}_{k=1}^{n}$ are Lagrange fundamental polynomials. Let

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$E_n(x) = \sup_f |f(x) - L_n(f,x)|$. In every point $x \in [-1,1]$ let

$$|l_k^{(n)}(x)| \leq |l_{k+1}^{(n)}(x)| \quad \text{for} \quad x_k^{(n)} < x_{k+1}^{(n)} \leq x$$

$$|l_k^{(n)}(x)| \geq |l_{k+1}^{(n)}(x)| \quad \text{for} \quad x \leq x_k^{(n)} < x_{k+1}^{(n)} .$$

Then for $x \in [-1,1]$ it holds uniformly with respect to x:

$$E_n(x) = \sum_{k=1}^{q} |\lambda_k| (x_{k+1} - x_k) + \sum_{k=q+1}^{n} |\lambda_k| (x_k - x_{k-1}) + 0\left(\frac{1}{n}\right),$$

where

$$\lambda_k = \sum_{s=1}^{k} l_s^{(n)}(x), \quad k = 1,2,\ldots,q$$

$$\lambda_k = \sum_{s=k}^{n} l_s^{(n)}(x), \quad k = q+1,\ldots,n.$$

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"APPROVED FOR RELEASE: 06/08/2000 CIA-RDP86-00513R000205010011-1

Approximation of Non-Periodic Functions by Interpolation Polynomials SOV/140-58-6-4/27

Here q can be determined uniquely from the inequations $x_q^{(n)} \leqslant x \leqslant x_{q+1}^{(n)}$.

From the theorem there result some conclusions.

There are 4 references, 3 of which are Soviet, and 1 American.

ASSOCIATION: Novgorodskiy pedagogicheskiy institut (Novgorod Pedagogical Institute)

SUBMITTED: February 13, 1958

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APPROVED FOR RELEASE: 06/08/2000 CIA-RDP86-00513R000205010011-1"

"APPROVED FOR RELEASE: 06/08/2000 CIA-RDP86-00513R000205010011-1

BERMAN, D.L.

Divergence of Hermite-Fejè's interpolation process. Usp.mat.nauk 13 no.2:143-148 Mr-Ap '58. (MIRA 11:4)
(Interpolation)

APPROVED FOR RELEASE: 06/08/2000 CIA-RDP86-00513R000205010011-1"

"APPROVED FOR RELEASE: 06/08/2000 CIA-RDP86-00513R000205010011-1

AUTHOR: Berman, D.L. (Novgorod) 20-119-6-1/56

TITLE: On the Distribution of the Knots in the Interpolation Process of S.N.Bernshteyn (O raspredelenii uzlov v interpolyatsionnom protsesse S.N.Bernshteyna)

PERIODICAL: Doklady Akademii nauk SSSR, 1958,Vol 119,Nr 6,pp 1063-1065(USSR)

ABSTRACT: Let f(x) be defined between [-1,1] and let

(1) $-1 \leqslant x_1^{(n)} < x_2^{(n)} < \ldots < x_n^{(n)} \leqslant 1$, $n=1,2,\ldots$

be a triangular knot matrix. Furthermore let $\{A_n(f,x)\}_{n=1}^{\infty}$ be the process of interpolation of Bernshteyn [Ref 1] :

(2) $A_n(f,x) = \sum_{j=1}^{n}{}' f(x_j^{(n)}) r_j(x)$, $r_j(x) = l_j(x) + (-1)^{j-1} l_{2pt_j}(x)$

where $\{l_j(x)\}_{j=1}^{n}$ are fundamental Lagrange polynomials of the n-th row of (1); p is an arbitrary fixed integer and the integer t_j is determined from $2p(t_j-1) < j < 2pt_j$. For $2pt_j > n$ let $l_{2pt_j}(x)=0$. The accent means that j omits the multiples of 2p.

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Furthermore let $x_k^{(n)} = \cos \theta_k^{(n)}$, $k=1,2,..,n$, $n=1,2,...$

The author says that the knots $\left\{x_k^{(n)}\right\}_{k=1}^{n}$ are distributed quasi-uniformly on the semicircle, if there exist constants c_1 and c_2 independent of n so that $\frac{c_1}{n} \leqslant \theta_\nu^{(n)} - \theta_{\nu+1}^{(n)} \leqslant \frac{c_2}{n}$, $\nu=1,2,..,(n-1)$, $n=2,3,...$

Theorem : between $[-1,1]$ let for all j and n be $\left|r_j^{(n)}(x)\right| \leqslant c_3$. Then the knots are distributed quasi-uniformly on the semicircle.

Theorem: In order that for an arbitrary function f(x) continuous between $[-1,+1]$ the process $\left\{A_n(f,x)\right\}_{n=1}^{\infty}$ converges uniformly to f(x) it is necessary that the knots of the polynomials $\left\{A_n(f,x)\right\}_{n=1}^{\infty}$ are distributed quasi-uniformly on the semicircle.

Two further theorems relate to the geometric interpretation of a former result of the author [Ref 2].

There are 4 Soviet references.

ASSOCIATION:Novgorodskiy gosudarstvennyy pedagogicheskiy institut (Novgorod State Pedagogical Institute)

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On the Distribution of the Knots in the Interpolation Process of S.N.Bernshteyn 20-119-6-1/56

PRESENTED: December 26, 1957, by S.N.Bernshteyn, Academician

SUBMITTED: December 26, 1957

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APPROVED FOR RELEASE: 06/08/2000 CIA-RDP86-00513R000205010011-1"

"APPROVED FOR RELEASE: 06/08/2000 CIA-RDP86-00513R000205010011-1

BERMAN, D.L.

AUTHOR: Berman, D.L. (Novgorod) SOV/20-120-6-1/59

TITLE: On the Impossibility of Constructing a Linear Polynomial Operator Which Gives an Approximation of the Order of the Best Approximation (O nevozmozhnosti postroyeniya lineynogo polinomial'nogo operatora, dayushchego priblizheniye poryadka nailuchshego)

PERIODICAL: Doklady Akademii nauk SSSR,1958,Vol 120,Nr 6,pp 1175-1177 (USSR)

ABSTRACT: Let $\widetilde{C}$ be the space of all continuous periodic functions f(x) with period 2π and the norm

$$\|f\|_{\widetilde{C}} = \max_{0\leq x<2\pi} |f(x)| .$$

Let $r_n(f,x)$ be the polynomial of best approximation of order n. $r_n(f,x)$ may be understood to be an operator which makes correspond to each $f\in\widetilde{C}$ the polynomial of best approximation of the order n.

Theorem: It exists no linear operation $U_n(f,x)$ with the following properties:

1.) $U_n(f,x)$ transforms $\widetilde{C}$ into $\widetilde{C}$,

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2.) For every $f \in \tilde{C}$, $U_n(f,x)$ is a polynomial of the order $\leq n$,

3.) For every $f \in \tilde{C}$ it is

$$\| f(x) - U_n(f,x) \| = O(E_n) ,$$

where

$$E_n(f) = E_n = \| f(x) - r_n(f,x) \| .$$

The theorem is generalized to the spaces of type E (see [Ref 2]), from which it also results the applicability to the spaces $\tilde{L}$ of all summable 2π-periodic functions with the norm

$$\| f \| = \frac{1}{2\pi} \int_0^{2\pi} |f(t)| \, dt$$

The author presents some further conclusions. 5 theorems are given altogether.
There are 6 Soviet references.

ASSOCIATION: Novgorodskiy gosudarstvennyy pedagogicheskiy institut (Novgorod State Pedagogical Institute)

APPROVED FOR RELEASE: 06/08/2000 CIA-RDP86-00513R000205010011-1"

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On the Impossibility of Constructing a Linear Polynomial Operator Which Gives an Approximation of the Order of the Best Approximation SOV/20-120-6-1/59

PRESENTED: February 13, 1958, by A.N. Kolmogorov, Academician

SUBMITTED: January 2, 1958

1. Mathematics 2. Operators (Mathematics)

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APPROVED FOR RELEASE: 06/08/2000 CIA-RDP86-00513R000205010011-1"

"APPROVED FOR RELEASE: 06/08/2000 CIA-RDP86-00513R000205010011-1

BERMAN, D.L.

On A.A.Polushkin's article "Similitude criteria for heat and mass exchange in the evaporation of a liquid." Inzh.-fiz. zhur. no.10:101-106 O '59. (MIRA 13:2)

1. Vsesoyuznyy teplotekhnicheskiy institut im. F.Dzerzhinskogo, Moskva.
(Evaporation) (Mass transfer) (Heat--Transmission)
(Polushkin, A.A.)

APPROVED FOR RELEASE: 06/08/2000 CIA-RDP86-00513R000205010011-1"

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~~16(1)~~ 05706

AUTHOR: Berman, D.L. (Leningrad) SOV/39-49-3-2/7

TITLE: Linear Trigonometric Polynomial Operations in the Spaces of Almost Periodic Functions

PERIODICAL: Matematicheskiy sbornik,1959,Vol 49,Nr 3,pp267-280 (USSR)

ABSTRACT: The formula of Faber-Marcinkiewicz [Ref 1,2] and former results of the author [Ref 3,4,5] are extended to almost periodic functions.
Let E be a space of almost periodic functions (Bohr,Stepanov or Weyl) . Let

(1.1) $P(x) = \sum_{j=1}^{n} a_j e^{\lambda_j xi}$; the set $\left\{ e^{\lambda_j xi} \right\}_{j=1}^{n}$ is

denoted C(P). Let K(x) be a fixed and P(x) an arbitrary generalized trigonometric polynomial of the type (1.1). It is said : "P(x) is of the spectrum K(x)", if $C(P) \subset C(K)$. Let

$M\left\{f(x)\right\} = \lim_{T\to\infty} \frac{1}{T} \int_0^T f(x)dx$. U(f,x) is called a linear tri-

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SOV/39-49-3-2/7

Linear Trigonometric Polynomial Operations in the Spaces of Almost Periodic Functions

gonometric polynomial operation of the type K on the real line, if 1.) U(f,x) linearly transforms E into E 2.) for all $f \in E$ U(f,x) is a trigonometric polynomial of the spectrum C(K), where K(x) is fixed and of the type (1.1) 3.) For every trigonometric polynomial of the type (1.1) of the spectrum C(K) it holds

(1.2) $U(T,x) = M_t\{T(x-t)K(t)\}$

Theorem 1.1 : Let $f \in E$ and let U(f,x) be defined as above; $f_t = f(x+t)$. Then it is

(1.4) $M_t(U(f_t,x-t)) = M_t\{f(x-t)K(t)\} = S(f,x)$

Theorem 1.2 : Let U(f,x) satisfy the above definition and operate from E to E . Then it is

(1.27) $\|U\| \geq \|S\|$

(for the Stepanov space $\mathfrak{S}_L^{(p)}$ it is e.g. :

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Linear Trigonometric Polynomial Operations in the Spaces of Almost Periodic Functions

$$\|f\|_{S_L^{(p)}} = \sup_{-\infty<x<\infty} \left[\frac{1}{L} \int_x^{x+L} |f(\xi)|^p \, d\xi \right]^{1/p}, \quad p \geq 1 \quad).$$

Let $\mathfrak{M}$ be an arbitrary subset of the unit sphere of E with the property that from $f \in \mathfrak{M}$ there always follows $f_t \in \mathfrak{M}$.

Let

$$\varsigma^{(U)} = \sup_{f \in \mathfrak{M}} \|f - U(f)\|$$

Theorem 1.3 : For an arbitrary linear trigonometric polynomial operation of the type K from E into E there holds

(Δ) $\varsigma^{(U)} \geq \varsigma^{(S)}$, where $S(f) = S(f,x) = M_t\{f(x-t)K(t)\}$.

Theorem 1.4 : Let $U(f,x)$ be an arbitrary linear trigonometric polynomial operation of the type K from E into E satisfying the condition

(1.32) $U(f_t,x) = [U(f,x)]_t$

for all $f \in E$. Then $U(f,x)$ is identical with $S(f,x)$.

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Linear Trigonometric Polynomial Operations in the Spaces of Almost Periodic Functions SOV/39-49-3-2/7

The author obtains analogous results for almost periodic functions on abelian groups.
There are 9 references, 5 of which are Soviet, 2 German, 1 American and 1 Hungarian.

SUBMITTED: May 23, 1957

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"APPROVED FOR RELEASE: 06/08/2000 CIA-RDP86-00513R000205010011-1

16(1)

AUTHOR: Berman, D.L. SOV/42-14-4-6/27

TITLE: On the Impossibility to Construct a Linear Polynomial Operator Which Yields an Approximation of the Order of the Best Approximation

PERIODICAL: Uspekhi matematicheskikh nauk, 1959,Vol14,Nr 4,pp 141-142 (USSR)

ABSTRACT: Let C be the space of all functions f(x) continuous on $[-1,1]$ with the norm $\|f\| = \max_{-1 \leq x \leq 1} |f(x)|$. To every $f \in C$ there exists a uniquely determined polynomial $r_n(f,x)$ of the order n which approximates f(x) best on $[-1,1]$. The polynomial $r_n(f,x)$ can be understood as an operator which associates to every $f \in C$ the polynomial of best approximation of degree n. This operator is non-linear, and a method for the construction of polynomials of best approximation is unknown. Thus the author tried to construct a linear operator $V_n(f,x)$ with the following properties:

1. $V_n(f,x)$ maps C onto C;

2. for every $f \in C$, $V_n(f,x)$ is a polynomial of at most n-th order;

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3. for every $f \in C$ we have $\| f(x)-V_n(f,x) \| = O(E_n(f))$, where $E_n(f) = \| f(x)-r_n(f,x) \|$.

Theorem: It is impossible to construct a linear operator with the enumerated properties.
There are 3 Soviet references.

SUBMITTED: December 26, 1957

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"APPROVED FOR RELEASE: 06/08/2000 CIA-RDP86-00513R000205010011-1

16(1)
AUTHOR: Berman, D.L.

SOV/20-124-1-1/69

TITLE: On a Method for the Construction of Interpolation Formulas (Ob odnom metode postroyeniya interpolyatsionnykh formul)

PERIODICAL: Doklady Akademii nauk SSSR,1959, Vol 124,Nr 1,pp 11-14(USSR)

ABSTRACT: Let C be the space of all functions continuous on $[-1,1]$, $\|f(x)\| = \max_{-1\leq x\leq 1} |f(x)|$; $R_{n,m}(x,t)$ algebraic polynomials of n-th order in x, of m-th order in t; $p(x)\geqslant 0$ a weight function;

$$(1) \quad \sigma_n(f,x) = -\int_{-1}^{+1} f(t)R_{n,m}(x,t)p(t)dt .$$

If in particular $\Omega = \{\omega_k(x)\}_{k=0}^{\infty}$ is an orthogonal system of polynomials of the weight $p(x)$ in $[-1,+1]$ and $\lambda = \|\lambda_k^{(n)}\|$, $k = 0,1,2,..,$ $n = 0,1,2,...,$ a given triangular numerical matrix, then the operator $\sigma_n(f,x)$ is for

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$$(2)\quad R_{n,n}(x,t) = \sum_{k=0}^{n} \lambda_k^{(n)}\, \omega_k(x)\, \omega_k(t)$$

the summation method of the Fourier series of $f(x)$ with respect to the system Ω. Let $\tilde{\sigma}_n(f,x)$ be the approximative value obtained from (1), if the integral is calculated according to the Gauß - Jacobi formula with the nodes in the roots $x_k^{(s)}$ of the polynomial $\omega_s(x)$.

Theorem : If $R_{n,m}(x,t)$ is given by (2) and if $\lambda_k^{(n)}=1$, $k=0, 1,2,\ldots,n$, $s = m = n$, then $\tilde{\sigma}_n(f,x)$ is identical with the interpolation formula $L_{n-1}(f,x)$ of Lagrange which is set up for $f(x)$ with the nodes in the roots of $\omega_n(x)$.

Theorem : Let the system Ω be identical with the polynomials of Jacobi $\omega_n(x) = J_n^{(\alpha,\beta)}(x)$, $-1 < \alpha, \beta \leq 0$.

Then it holds

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On a Method for the Construction of Interpolation Formulas SOV/20-124-1-1/69

$$\frac{\varrho_k^{(n)} \left| \omega_{n+1}(\cos \theta_k^{(n)}) \right|}{\sin^2 1/2\, \theta_k^{(n)}} \leqslant \frac{\varrho_{k+1}^{(n)} \left| \omega_{n+1}(\cos \theta_{k+1}^{(n)}) \right|}{\sin^2 1/2\, \theta_{k+1}^{(n)}}$$

$$\frac{\varrho_k^{(n)} \left| \omega_{n+1}(\cos \theta_k^{(n)}) \right|}{\cos^2 1/2\, \theta_k^{(n)}} \geqslant \frac{\varrho_{k+1}^{(n)} \left| \omega_{n+1}(\cos \theta_{k+1}^{(n)}) \right|}{\cos^2 1/2\, \theta_{k+1}^{(n)}}$$

Here is $x_k^{(n)} = \cos \theta_k^{(n)}$ and the $\varrho_k^{(n)}$ are the Christoffel numbers of the nodes $x_k^{(s)}$.

Theorem: If $p(x)\sqrt{1-x^2} \geqslant A > 0$, A=const, $\varrho_k^{(n)} = 0\,(\frac{1}{n})$, $2s - m \to \infty$, $n \to \infty$, then for $n \to \infty$ it follows from $\sigma_n \to f$

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On a Method for the Construction of Interpolation Formulas SOV/20-124-1-1/69

that $\tilde{\sigma}_n \to f$ for $n \to \infty$.

Theorem : If $0 < A \leq p(x)\sqrt{1-x^2} \leq B$, $2s - m \to \infty$, $n \to \infty$, then it follows from $\sigma_n \to f$ that $\tilde{\sigma}_n \to f$.

There are 10 references, 8 of which are Soviet.

ASSOCIATION: Novgorodskiy gosudarstvennyy pedagogicheskiy institut (Novgorod State Pedagogical Institute)

PRESENTED: August 25,1958, by S.N. Bernshteyn,Academician

SUBMITTED: August 24,1958

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AUTHOR: Berman, D.L.

TITLE: Linear Polynomial Operation on Groups

PERIODICAL: Izvestiya vysshikh uchebnykh zavedeniy. Matematika, 1960, No. 4, pp. 17 - 28

TEXT: Let G be a bicompact commutative group in which the invariant integration is explained and the measure of which is $\mu(G) = 1$.

Let $P(x) = \sum_{k=1}^{m} \lambda_k \chi_k(x)$, $x \in G$, where λ_k are complex numbers and $\{\chi_k(x)\}_1^m$ are characters of G. The set $\{\chi_k(x)\}_1^m$ is called the spectrum C(P) of the generalized trigonometric polynomial P(x). Let K(x) be a fixed, P(x) an arbitrary generalized polynomial: "P(x) is of the spectrum K(x) if $C(P) \subset C(K)^a$. Let $L^1 = L^1(G)$ be the set of all μ-measurable functions f(x) for which $\int_G |f(x)| d\mu(x) < \infty$.

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Linear Polynomial Operation on Groups S/140/60/000/004/008/023 XX
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The author considers the space of functions $E = E^{(G)}$ satisfying the following axioms: 1. Elements of the E are functions of L^1 ; 2. E is a linearly normed space with addition and multiplication with a number explained in the usual manner ; 3. $\|f\|_E = \||f|\|$, where $|f|$ is the absolute value of f ; 4. If for all elements of G it holds : $|f(x)| \leq |g(x)|$, then $\|f\|_E \leq \|g\|_E$; 5) If $f \in F$, then it holds $f_t \in E$ for all $t \in G$, where $\|f\|_E = \|f_t\|_E$ ($f_t(x) = f(x+t)$, where $t \in G$). 6. E contains the set Q of all trigonometric polynomials on G, where Q is everywhere dense in E in the sense of the norm of E.
Definition: Let E_1 and E_2 be spaces of the type E. U(f,x) is called a generalized linear trigonometric polynomial operation on the group G of the type K(short: GLTPO K/G) if 1) U(f,x) is a linear operation transferring E_1 into E_2 ; 2) For every $f \in E_1$, U(f,x) is a generalized trigonometric polynomial on G of the spectrum C(K), where $K(x) = \sum_{k=1}^{n} \alpha_k \chi_k(x)$

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is fixed; 3) For every generalized polynomial T of the spectrum C(K) it holds $U(T,x) = \int_G T(x-t)K(t)d\mu(t)$.

Theorem 1.1 : Let $f \in E_1$ and $U(f,x)$ be an arbitrary GLTPO K/G transferring E_1 in E_2 . Then

$$(0.4) \qquad \int_G U(f_t, x-t)d\mu(t) = \int_G f(x-t)K(t)d\mu(t) = \sigma(f,x) .$$

Theorem 1.2 : Among the different GLTPO K/G of E_1 into E_2 the operation $\sigma(f,x) = \int_G f(x-t)K(t)d\mu(t)$ has the smallest norm, i.e.

$$(0.5) \qquad \|U\| \geq \|\sigma\|_{E_1}^{E_2} ,$$

where $\|\sigma\|_{E_1}^{E_2}$ is the norm of the operation $\sigma(f,x)$ of E_1 into E_2 .

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Linear Polynomial Operation on Groups S/140/60/000/004/008/023 XX
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Let $\varsigma^{(U)} = \sup_{f \in \Omega} \| f - U(f) \|$, where Ω is a subset of the unit sphere $\| f \|_E \leq 1$ having a dense subset of functions continuous on G, and having the property that from $f \in \Omega$ it follows $f_t \in \Omega$ for an arbitrary $t \in G$.

Theorem 1.3 : Let U(f,x) be an arbitrary GLTPO K/G of E into E. Then $\varsigma^{(\sigma)} \leq \varsigma^{(U)}$, where $\sigma(f,x) = \int_G f(x-t)K(t)d\mu(t)$.

U(f,x) is called sliding if $U(f_t,x) = \{U(f,x)\}_t$ (cf. S.M. Loz inskiy (Ref. 7)).

Theorem 1.4 : Let U(f,x) be an arbitrary sliding GLTPO K/G of E_1 into E_2. Then $U(f,x) = \sigma(f,x)$.

Theorem 1.5 asserts that it is possible to construct a generalized polynomial operator which guarantees an approximation of best order.

The author mentions A.N. Kolmogorov. There are 11 references: 9 Soviet, 1 Hungarian and 1 German.

SUBMITTED: April 28, 1959

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88177
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C111/C222

16.4200

AUTHOR: Berman, D.L.

TITLE: Some Inequations and Their Application for the Investigation of Interpolation Processess

PERIODICAL: Izvestiya vysshikh uchebnykh zavedeniy.Matematika, 1960, No. 6, pp. 24 - 30

TEXT: Let $\tilde{C}$ be the space of 2π - periodic continuous functions with the norm $\|f(x)\| = \max_{0\leq x<2\pi} |f(x)|$. Let

$$(1) \quad \sigma_n(f,x) = \sigma_{n,m}(f,x) = \int_0^{2\pi} f(t)\Phi(x,t)p(t)dt \quad ,$$

where $\Phi(x,t)$ is a trigonometric polynomial of the order n in x and m in t while $p(t) \geq 0$ is the weight. Given the knots of interpolation

$$(M) \qquad \begin{matrix} x_1^{(0)} \\ x_1^{(1)} x_2^{(1)} x_3^{(1)} \\ \cdots\cdots\cdots\cdots\cdots\cdots \\ 0 \leq x_1^{(n)} < x_2^{(n)} < \ldots < x_{2n+1}^{(n)} < 2\pi, \quad n = 0,1,2,\ldots \end{matrix}$$

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Some Inequations and Their Application for the Investigation of Interpolation Processes

As it is well-known, there exists a unique system of trigonometric polynomials of the order n : $\left\{1_k^{(n)}(x)\right\}_{k=1}^{2n+1}$, which satisfy the conditions $1_j^{(n)}(x_k^{(n)}) = \delta_{jk}$, $j,k = 1,2,\ldots, (2n+1)$, $n = 0,1,2,\ldots$ Let $\varrho_j = \varrho_j^{(n)} = \int_0^{2\pi} 1_j^{(n)}(x)p(x)dx$, $j = 1,2,\ldots (2n+1)$, $n = 0,1,2,\ldots$ and

$$(2)\quad \tilde{\sigma}_n(f,x) = \tilde{\sigma}_{n,m}(f,x) = \sum_{j=1}^{2n+1} f(x_j^{(n)})\, \varrho_j^{(n)} \phi(x,x_j^{(n)}).$$

Theorem 1 : For every trigonometric polynomial S(x) of the order $\leq n$ it holds :

$$(3)\qquad |S(x)| \leq \frac{3}{\pi} \int_0^{2\pi} |S(t)| K_n(t-x)dt$$

where $K_n(t)$ is the kernel of n-th order of Fejér.

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Theorem 2 : Let the function $M(u)$ be defined, convex and non-decreasing for $u \geq 0$ and let $M(0) \geq 0$. Let the knot matrix be so that there exists an integrable function $p(x)$ satisfying the conditions

$$\varrho_j = \int_0^{2\tilde{\pi}} l_j^{(n)}(x) p(x) dx \geq 0 \quad , \quad j = 1,2,\ldots, 2n+1 \quad ,$$

$$0 \leq p(x) \leq L \quad , \quad 0 \leq x < 2\tilde{\pi} \quad ,$$

where L is a constant. Then for every polynomial $S(x)$ of the order $\leq n$ it holds

$$(6) \qquad \sum_{j=1}^{2n+1} \varrho_j M\left[|S(x_j^{(n)})|\right] \leq L \int_0^{\tilde{\pi}} M\left[3|S(x)|\right] dx$$

Conclusion 1 : Let $M(n) = u^p$, $1 \leq p < \infty$, and let $(x_j^{(n)})$ satisfy the assumptions of theorem 2. Then for every $S(x)$ of the order $\leq n$ it holds

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(12) $$\sum_{j=1}^{2n+1} \varrho_j |S(x_j^{(n)})|^p \leq 3^p L \int_0^{2\pi} |S(x)|^p dx$$

From the theorems 1 and 2 there follows the fundamental theorem :
Theorem 3 : Let m be an integral-valued function of n. Let the matrix $(\mathfrak{M})$ consist of the zeros of the system of functions

(14) $$\omega_n(x) = \sum_{k=0}^{n} (a_k \cos (k + \tfrac{1}{2})x + b_k \sin (k + \tfrac{1}{2}) x)$$

consisting of functions orthogonal with respect to the weight p(x), where $0 < l \leq p(x) \leq L$. For every $f \in C$ be uniformly

(I) $$\sigma_n(f,x) \to f(x) \quad \text{for} \quad n \to \infty, \; -\infty < x < \infty$$

and let $2n - m \to \infty$, $n \to \infty$. Then for every $f \in \widetilde{C}$ it uniformly holds:

(II) $$\widetilde{\sigma}_n(f,x) \to f(x) \quad \text{for} \quad n \to \infty, \; -\infty < x < \infty .$$

Let in $(\mathfrak{M})$: $x_1 = 0$, $x_{2n+2} = 2\pi$.

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Some Inequations and Their Application for the Investigation of Interpolation Processes

Theorem 4 : 1) Let the kernel of the operator (1) be a trigonometric polynomial depending only on $(t - x)$ or $(t + x)$;
2) Let $(\mathcal{M})$ consist of the zeros of (14) where the functions (14) are orthogonal with respect to $p(x)$,

(20) $\quad 0<1\leq p(x)\leq L\ ,\quad 0\leq x\leq 2\pi\ .$

3) Let for every $f\in\widetilde{C}$ (II) be uniformly satisfied. Then for every $f\in\widetilde{C}$ (I) holds uniformly too.

Theorem 5 : Let $S(x)$ be a trigonometric polynomial of the order $\leq n$, $1<p<\infty$, and let the knot matrix consist of functions (14) orthogonal with respect to the weight $p(x)$ where $0<p(x)\leq L$, $0\leq x<2\pi$. Then there exists a constant A_p so that

$$\left\{\int_0^{2\pi}|S(x)|^p dx\right\}^{1/p}\leq A_p\left\{\sum_{j=1}^{2n+1}\varsigma_j|S(x_j)|^p\right\}^{1/p}$$

The author mentions A.Kh. Turetskiy. There are 6 references : 3 Soviet, 1 German, 1 Polish and 1 American.

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